In 2 Sections—Part 1

Industrial Standardization

Commercial Standards Monthly

April

Standard Abbreviations Save Time and Space

See Page 81

1941

The American Standards Association

Object

To provide systematic means for arriving at national standards for use by industry, government, and consumers.

437 Standards approved and issued *(list sent on request)*

Mechanical standards for parts, tools, pipe, fittings, bolts, screws, bearings, drawings, etc. (77 standards.)

Specifications for raw, semi-finished, and finished materials and products. (135 standards.)

Methods of test. (76 standards.)

Mining standards. (19 standards.)

Electrical standards for motors, wires and cables, insulators, switchgear, etc. (69 standards.)

Safety codes for the protection of workers from industrial accidents and diseases. (70 standards.)

Highway safety standards. (4 standards.)

Building code standards. (36 standards.)

Standards for consumer goods. (17 standards.)

400 National Groups Cooperating

3,000 men and women on technical committees

Basic Principal of Operation

Every group substantially concerned with a standard has an inherent right to a voice in its development.

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Am. Institute of Bolt, Nut & Rivet Mfrs.
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This Issue

ASA

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Save Time and Space with
American Standard Abbreviations

by George A. Stetson[1]

Chairman, Sectional Committee on Letter Symbols and Abbreviations for Science and Engineering (Z10)

REVISION of the American Standard abbreviations for scientific and engineering terms, just completed and approved, affords a special opportunity to direct attention to some of the general principles followed by the committee responsible for these increasingly popular forms.

The present revision contains relatively few changes from the edition approved in 1932. A few new abbreviations have been added, and an important change has been made in the abbreviation for pounds per square inch, which is a cumbersome term and gives rise to several variants in forming abbreviations for it.

What has happened in this case illustrates evolutionary trends in abbreviations, and the reason for adopting the new form offers an example of the application of the committee's general rules.

The new abbreviation for pounds per square inch is psi; the form in the 1932 list was lb per sq in. Many writers began using the new form years ago, and its obvious appropriateness and economy of space led to its adoption by a number of engineering publications before it had become accepted in the new American Standard.

If it is admitted that one of the chief reasons for using abbreviations is economy of time and space, then the new form has admitted advantages. Most printing today is made from type cast on a linotype or monotype machine. These machines have keyboards that are operated like typewriters. The time required for typesetting therefore depends on the number of keys struck by the operator. In the 1932 form, lb per sq in., thirteen operations are necessary for the letters, spaces, and the single period. In the new form, three operations replace the thirteen. Not only is the compositor's time saved, but there is less space wasted; and this is particularly advantageous in tabular matter where space limitations are sometimes critical.

The new form also removes the only space-saving arguments of advocates for forms not approved by the committee for other reasons, such as: lb/sq in., lb/in.^{2}, lb in.$^{-2}$, #/in.^{2}, #/sq in.; etc. The committee early decided not to recognize use of the slant bar / for per, the exponent for square or cube, the character # for pound, although it admitted that there might be cases in which lack of space or other considerations would justify such usage.

Periods and Spaces Omitted

Another principle which the committee adopted early in its career and applied in its 1932 and 1941 standard forms was the elimination of periods and spaces. The customary abbreviation for revolutions per minute before the American Standard was issued was either r.p.m., or r. p. m. Good typography had given rise to the first form to avoid the sprawling appearance of letter combinations with spaces between them, although many editors still paid no attention to this detail. When the American Standard form was

[1] Editor, Mechanical Engineering, American Society of Mechanical Engineers.

adopted, eight, or at least six, keyboard operations were replaced by three without confusing the reader. Confusion was more likely with some other forms made by following the rule of omitting periods and spaces and adopting very condensed forms. For example mphps (miles per hour per sec) may not be as readily recognized as rpm would be, but it has justification in logic and is usually made clear by the context.

Consistency Hard to Obtain

In its early meetings the Committee was bothered somewhat by attempting to be consistent. It could proceed with its task in either of two ways. It could issue a list of abbreviations of single words: pound, inch, square, minute, etc., and let users combine these to make abbreviations of terms involving several words, but it didn't take long to decide that this was not the way to go to work. Exceptions and inconsistencies became all the more obvious, and the risk was run that, in making up his own abbreviations from words which would have to have more than one abbreviated form, the reverse of standardization would result. So the committee made current usage its criterion and selected the forms most widely used. Leaving out spaces and periods was its own idea of a desirable economy that could be effected without too much distortion of familiar forms.

Consistency was admitted when convenient and useful, therefore, and when not, refuge was taken in the conviction that consistency in human beings is unnatural. The letter m would have to mean minute, or mile, or meter, or milli, or million, or even thousand; per would have to be spelled out in some cases and used as p in others; hour might have to be hr or even h if violation were not done to well-established forms. And why not? What advantage, just for the sake of consistency, to write miles per hour, or miles per hr when mph was in such good usage?

The Sectional Committee on Letter Symbols and Abbreviations for Science and Engineering by action of its Executive Committee January 22, 1927, authorized the appointment of a subcommittee to develop a standard list of abbreviations for scientific terms for use in publications. The scope of the subcommittee's activities was defined as follows: ". . . while this subcommittee should confine its formal activities to abbreviations which lie strictly within the purview of the sectional committee, it might be helpful if it would include informally and for purposes of recommendation any related matters such as spelling and style which may impress the subcommittee as in need of clarification or standardization."

The subcommittee was organized in the early part of 1927 and issued its first progress report in July, 1927. The abbreviations included in the body of this report were those which were preferred for use in typewritten or printed text.

The first standard for abbreviations was submitted to the sectional committee for approval in March, 1931, and was subsequently approved by the five sponsor organizations. It was then presented to the American Standards Association for approval as an American Tentative Standard, this approval being given in November, 1932.

A revision of this standard was initiated in the spring of 1939 and the first tentative draft was prepared and distributed in August, 1939, to the members of Subcommittee No. 11, the officers of Sectional Committee Z10, and to the members of its Steering Committee for critical comment. The comments received were reviewed at the November, 1939, meeting of the subcommittee. The resultant revision dated March, 1940, was approved by letter ballot vote of the Sectional Committee and was subsequently approved by the sponsor organizations and the American Standards Association. It was designated as an American Standard in March, 1941.

Leadership for the work of the committee has been taken by the American Association for the Advancement of Science, the American Institute of Electrical Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, and the Society for the Promotion of Engineering Education.

The revised document, American Standard Abbreviations for Scientific and Engineering Terms (Z10.1-1941), is now on the press and copies will be available within the next few weeks.

Another interesting innovation that the Committee dared to make was in abbreviations for units in the temperature scales. The abbreviation deg, and its equivalent the degree sign °, were dropped overboard, in cases where a specific temperature was involved. To write 212 F or 100 C is quite as intelligible, and much closer to the dictates of economy, than to write 212 deg. fahr. or even 212 deg F, or, for that matter, 212°F. Of all the innovations, this one has given rise to the most queries; but once explained, it has generally been accepted as being worthwhile.

When the Committee Lost Its Courage

On one point the committee lost its courage and recommended a weak-kneed compromise. It was pointed out that the omission of periods might be confusing if the abbreviated form made a common English word, as in in for inch, or bar for barometer. Counter arguments that no one objected to sin and tan and cot, long accepted abbreviations for sine, tangent, and cotangent, did not prevail. The compromise consisted in admitting use of the period in abbreviations forming some common English words, but in omitting the period in the cases of well-known mathematical abbreviations. Perhaps a later revision will find the committee in a mood to trust to the intelligence of readers who are bright enough to know that log 303 probably does not refer to the number of sticks in a cord of wood, and who may be trusted also to interpret 29.92 in bar as a measure of the barometric pressure and not the number of persons making up a cocktail party.

ASTM Compiles Standards In Special Fields

Recent publications issued by the American Society for Testing Materials combine in one document all of the approved ASTM standards in a particular field. Manuals published recently by the ASTM, which give the most up-to-date edition of the standards in each case, include:

1940-1941 Standards on Coal and Coke	$1.25
Manual of ASTM Standards on Refractory Materials, 1940-1941.....	$1.50
ASTM Standards on Rubber Products, 1940-1941.....	$1.75
ASTM Standards on Paint, Varnish, Lacquer and Related Products....	$2.00

Many of the standards in the manual on Coal and Coke have been approved by the American Standards Association, notably the American Standard Specifications for Classification of Coals by Rank (B20.1-1938); the American Standard Specifications for Classification of Coals by Grade (M20.2-1937); the American Standard Method for Designating the Size of Coal from Its Screen Analysis (B20.3-1938); and the American Standard Specifications for Sieves for Testing Purposes (Z23.1-1939) among others.

In addition to the standard specifications, tests, and definitions in the Manual of ASTM Standards on Refractory Materials, nine industrial surveys of refractory service conditions, each one prepared by a competent authority in the industry, are also included. Information on standard samples of refractory materials is also given.

Accuracy of Engine Lathes Suggested as Emergency Project

A proposed standard for Accuracy of Engine Lathes is the subject of the most recent request to the American Standards Association for development of an American Defense Emergency Standard. The request came from the National Machine Tool Builders Association, which had submitted its standard for Accuracy of Engine Lathes to the American Standards Association in July, 1940.

In requesting that the standard be placed under the ASA Emergency Procedure the NMTBA declared that "it manifestly would be a service to the defense efforts if this standard could be recorded and put out in printed form so that it would have the backing of the Standards Association." The standard would be particularly useful "to the purchasing divisions of the government in setting specifications for defense purchases," the NMTBA explained.

The chairman of the Standards Council has asked each member of the ASA Committee on Small Tools and Machine Tool Elements (B5) for advice as to whether the proposed standard for Accuracy of Engine Lathes should be developed under the Emergency Procedure.

Finucane Heads Eastman Standards Department

Dan Finucane is now head of the Standards Department of the Eastman Kodak Company. Mr. Finucane succeeds C. F. Bullard who has transferred to the Eastman purchasing department.

Specifications for Hospital Supplies Are Published to Help Buyers

BUYERS of hospital supplies will now find it helpful to consult a new *Manual of Specifications for the Purchase of Hospital Supplies and Equipment*, just published by the American Hospital Association.

Specifications prepared by several Federal agencies, including the Division of Simplified Practice, and the Division of Trade Standards of the National Bureau of Standards, the Department of War, the Department of the Navy, the Veterans' Administration, and the Department of the United States Treasury are given in the Manual, as well as standards and specifications of non-governmental agencies, such as the National Fire Protection Association, the American Gas Association, the American Institute of Architects, the American Society of Refrigerating Engineers, and the National Safety Council.

Four special chapters on subjects pertinent to purchasing, testing, checking, storage, and standardization of commodities are also included. These chapters were prepared by members of the Committee on Simplification and Standardization of Hospital Furnishings, Supplies, and Equipment of the American Hospital Association: William E. Braithwaite, Department of Simplified Practice, National Bureau of Standards; Dewey H. Palmer, research engineer, Hospital Bureau of Standards and Supplies; Neal R. Johnson, purchasing agent, Johns Hopkins Hospital, Baltimore; and Edgar C. Hayhow, superintendent of the Paterson General Hospital, Paterson, New Jersey.

A supplementary list of standards and specifications which may be useful to hospitals but which could not be included in the Manual in full includes American Standards for gas appliances; regulations for air conditioning and blower systems; building exits code; drinking fountains, and the codes for lighting, among others.

The Manual of Specifications for the Purchase of Hospital Supplies and Equipment, prepared by the Committee on Simplification and Standardization of Hospital Furnishings, Supplies, and Equipment of the American Hospital Association's Council on Hospital Planning and Plant Operation, may be ordered from the American Hospital Association, 18 East Division Street, Chicago, Illinois.

Printers Request Standards For Printing Press Sprays

Spray solutions used to prevent offset on printing presses will be the subject of a new ASA project if a request received recently from the New York Employing Printers Association is approved by the ASA Standards Council. Modern high-speed methods have made spray systems essential as a pressroom tool, the Association declared in its request, but unfortunately, some of the spray solutions on the market today are said to contain ingredients harmful to the health of those exposed to them.

Letters supporting the request of the Employing Printers have been received from the American Type Founders, the Allied Printing Trades Council of Greater New York, New York Local Union No. 119 of the International Brotherhood of Bookbinders, International Printing Pressmen and Assistants Union of North America, New York Printing Pressmen's Union No. 51, Printers National Association, and New York Typographical Union No. 6.

The ASA Standards Council is considering the request for the new project.

New Manual Recommends Plumbing Practice

A manual of recommended plumbing practice, prepared by a committee representing Federal agencies most concerned with the subject, has been published as Building Materials and Structures Report, BMS66. The committee has taken into consideration available recommendations of other bodies and results of research performed in the laboratories of the National Bureau of Standards. Part I is an introduction explaining the origin of the work. Part II contains recommendations regarding necessary sizes of piping, precautions against pollution of water supply, permissible types of venting, and other matters customarily covered in plumbing codes. Part III gives information useful in applying the recommendations, including illustrative interpretations of the specific requirements in Part II. The recommendations are presented as suitable for adoption by Federal agencies engaged in actual plumbing work or in passing upon plans of structures.

Copies of BMS66 are now being sold by the Superintendent of Documents, Government Printing Office, Washington, D. C., at 20 cents each.

Courtesy American Machinist

New Defense Program Stresses Aircraft Standards Coordination

Standards Group is set up by Office of Production Management to correlate aircraft standards.

Work of industrial groups on standards is allotted to the Society of Automotive Engineers and the National Aircraft Standards Committee.

A STANDARDS meeting called by the Aircraft Section of the Office of Production Management February 28 has resulted in a plan whereby the Standards Group of this Government defense agency will cooperate with the Aeronautical Board, the National Aircraft Standards Committee, the Society of Automotive Engineers, and the Aeronautical Chamber of Commerce, as well as other Government departments, in national coordination of aircraft standardization. As a result of this meeting, the work on aircraft standards has been allocated as follows:

1. The Standards Group of the OPM Aircraft Section will act as the standards coordination unit for the other Government agencies which have an interest in aircraft standards and specifications. These include the Army-Navy-British Standardization Subcommittee; the Aeronautical Board (Army-Navy); Air Corps; Bureau of Aeronautics (Navy); and Civil Aeronautics Authority. The Standards Group will allocate work on aircraft standards on a national scale in order to prevent confusion as to what subjects are to be covered by each organization and to meet the needs of national defense. The Group's coordination services, it is planned, will include dissemination of information on the work being done on standards. Wherever it appears that work is being duplicated or that some subject needing study is being neglected, this situation will be called to the attention of all parties concerned, with the suggestion that they get together to take care of it. The Group will also act as referee in any controversies which may arise.

2. Responsibility for the development of technical standards on engines, propellers, accessories

and equipment, and materials and processes, has been assigned to the Society of Automotive Engineers.

3. Responsibility for airframe and powerplant installation has been assigned to the National Aircraft Standards Committee which represents practically all of the manufacturers of Army and Navy aircraft. The NASC also provides interchange of information and technical data between aircraft manufacturers. The NASC powerplant installation committee is to include representatives from committees working on the airframe, engine, propeller, and accessories and equipment standards.

4. Standards activities concerning airframes, engines, propellers, and accessories and equipment have been assigned to committees on which the Air Corps, the U. S. Navy, and the Civil Aeronautics Authority are to have membership under the leadership of whichever national organization is responsible for the subject. The results of their work are to be submitted to the Government for final approval.

5. The Technical Department of the Aeronautical Chamber of Commerce will function as a liaison for the NASC, providing technical information which the NASC will distribute to its aircraft manufacturer members.

T. P. Wright, Assistant Chief of the Office of Production Management, outlined the principles upon which the discussions at the February 28 meeting and the coordination program were based as follows:

1. There is a present lack of standards. This is undesirable as general standardization facilitates production.
2. There has been in the past some lack of coordination between industry and the Aeronautical Board. The interests of both the customer and the manufacturer must be considered in standardization work.
3. The main function of the OPM in standards work is to coordinate these efforts in the interest of conservation of energy.
4. The OPM is not setting up any standards committees nor planning on building up a technical staff for such work. It relies on the organizations represented at this meeting for the actual production of standards.
5. In cases of difficulty the OPM will undertake the job of arbitrator.
6. Standards issued too soon may be bad because of interference with production and too early freezing of design as well where further development is desirable.
7. The Aeronautical Board is official agency for control of standards on military airplanes.
8. This organization has stated that it will welcome the help of industry in preparing the technical data on standards.
9. For standardization between American and British Aircraft the Joint Army-Navy-British Standardization Subcommittee is the governing agency.
10. The airlines have valuable information on many of the items involved and should be included in some of the committees.

In announcing the new standardization program to its members, the Aeronautical Chamber of Commerce of America points to the possibility of permanent, long-range planning for coordination of aircraft standards.

"There should be a long-range plan for coordinating standards work," the Chamber declares. "The Technical Department intends, therefore, to keep in close enough touch with the whole standards picture to insure that the transition to be experienced in the years to come is not too abrupt. The details of this participation are being worked out in cooperation with the officers of NASC and SAE and the responsible parties on the Aeronautical Board and OPM staff."

The organization of the entire Aircraft Section of the Production Division of the Office of Production Management is given on the opposite page.

A Correction Corrected

The statement made on page 73 of our March issue regarding a correction to be made in the pamphlet, *Tolerances for Cylindrical Fits*, requires a correction itself, we find. The error referred to in this item was not caught *before* the pamphlet went to press, but very soon after it came from the press. Therefore, the necessary correction was not made in the type itself as indicated in our correction but has been made by hand in all copies supplied by the ASA office since the error was discovered. It is possible, however, that there are a few copies in circulation in which the correction was not made. Anybody in possession of such a copy of the pamphlet, please change "minus 4 tenths," page 13, line 14, to "minus 5 tenths."

The Aircraft Section of the Production Division, Office of Production Management

Merrill Meigs, *Chief*
(on leave as Publisher of the Chicago *Herald American*)

T. P. Wright, *Assistant Chief*
(formerly Vice-President, Curtiss-Wright Corporation)

Engineering Unit

Lieutenant Colonel E. M. Powers
(on detached service from the U. S. Air Corps)

Engineering Specialists Group. R. E. Palmer (formerly of Lycoming); and E. S. Taylor (Massachusetts Institute of Technology).

Mr. Palmer confines his activities to propeller engineering and manufacturing problems. Mr. Taylor is assigned to study power-plant engineering.

Standards Group. C. E. Stryker (formerly with Bendix Aviation, Ltd.).

This group is cooperating with the Aeronautical Board, the Society of Automotive Engineers, and the National Aircraft Standards Committee in standardization problems, and has responsibility for coordinating and allocating work on aircraft standards.

Production Planning Unit

Dr. A. E. Lombard, Jr.
(formerly, California Institute of Technology and Curtiss-Wright)

Scheduling and Allocation of Materials and Equipment Group. C. N. Nyden (formerly with the Material Division, Douglas Aircraft).

This group will act as the liaison group with Wright Field on allocation and scheduling of materials and equipment.

Foreign Contacts Group. A. O. Pierrot (formerly represented leading American aircraft manufacturers in South America).

Contact between foreign purchasers, other than British, and coordination of aircraft matters between foreign (especially Latin American) buyers and the Office of Production Management is the responsibility of this Group.

Airplane Program Group. Kendall Perkins (American Airlines and Curtiss-Wright).

Responsibility for the broad delivery program to meet requirements of the Army, Navy, British, and other customers is centered in this Group. It will establish and revise combined delivery schedules of these various groups; study manufacturing capacities for meeting required schedules; coordinate requests for additional equipment with previously established schedules as a guide for approval of new requests; and record progress on the scheduling and allocation of aircraft for British and other foreign countries in collaboration with the President's Liaison Committee.

Production Analysis Group. Robert E. Lees (formerly, U. S. Maritime Commission).

Progress in the aircraft production program is reported and analyzed here. Mr. Lees also serves as assistant to the chairman of the Commercial Aircraft Priorities Committee and as secretary for that committee.

Light Plane and Engine Group. Harry A. Shaffer (Interstate Credit Corporation).

Work of this group is in particular reference to the flight equipment needs of the Civilian Pilot Training Program.

Manufacturing Unit

A. J. Brandt
(formerly, General Motors Corp.)

Machine Tools Group. F. W. Ayers (formerly General Motors and Daimler Automobile Corporation).

This group reallocates and secures machine tools and production facilities not in use at present, as well as following up on the status of machine tools and materials.

Facilities Group. H. R. Boyer (president, Allen Corporation of Detroit).

This work includes securing plant facilities for primary contractors, coordinating activities of prime and subcontractors, and keeping on record available facilities for the aircraft manufacturers so production schedules can be met.

Canada Regulates Radio Interference

Canadian Engineering Standards Association Works on Standards for Acceptable Limits of Interference and Methods of Measurement

CONTROL of radio interference became official in Canada February 8, 1941 by order of the Governor-in-Council, when regulations for controlling interference took effect. In enforcing the regulations, standard limits of interference and methods of measurement prepared by the Canadian Engineering Standards Association will be taken into consideration. In all cases of interference, it is announced, the relative responsibility of the user of the interfering apparatus, and also of the broadcast listener or radio operator will be carefully considered. Radios with indoor or built-in antennae will not be protected from interference by the new regulations since these antennae have not sufficient effective height to entitle the users to protection, announcement of the new regulations explains.

As defined in the regulations "interference" means the detrimental effect to radio reception of a radio signal having a field strength of 500 microvolts per meter, or greater, on a receiving installation approved by the Minister as being satisfactory for the purpose. As interpreted by the Radio Division of the Department of Transport, Ottawa, the signal to interference ratio of 30 db shall be considered good reception. Interference voltage measured at antennae and ground terminals less than 30 db below that which would be produced by a signal having a signal field strength of 500 microvolts per meter will not be considered as detrimental to reception. It is explained that this tolerable limit of signal to interference ratio of 30 db is such that the interference is just audible but not objectionable. In order to obtain reception that is absolutely free from interference the signal to interference ratio must be 40 or 45 db, the Radio Division announcement declares.

Susceptibility and Height Will Be Considered

In determining whether the receiving installation shall be considered satisfactory, the susceptibility of the radio receiver and the effective height will be considered. If it is suspected that the complainant's receiver is particularly susceptive to interference, a comparison of receiving conditions may be made by using a Departmental receiver, which is known to be susceptible within reasonable limits. The limit of susceptibility of receivers "satisfactory for the purpose" will be set so as to exclude only receivers of exceptionally poor characteristics, it is explained.

An outdoor antenna is necessary in order that the receiving set may be approved by the Minister as being satisfactory for the purpose, since the required effective height will be one-half meter or greater.

The user of the interfering apparatus will be responsible both for finding a means of suppression and for actually suppressing the interference.

CESA Working on Interference Limits

The interference coupling ratio to low voltage wiring is specified not to exceed –36 db, and to power lines as not to exceed –10 db. The ratio to electric railway systems shall not exceed –16 db. The Canadian Engineering Standards Association is now working on the setting of tolerable limits of interference at the source. The control of apparatus which causes interference may be taken up by the provinces at a later date.

The instrument to be used in measuring the interference field strength is to be a standard interference measuring instrument meeting the requirements of the Canadian Engineering Standards Association.

The present regulations have been put into effect as the result of the Canadian Broadcasting Act of 1936 which among other provisions empowered the Governor-in-Council to make regulations prohibiting or controlling the use of equipment liable to cause radio interference.

Before adopting such regulations, tolerable limits of interference, methods of measurement, and coordination of Dominion and Provincial control of radio interference had to be worked out. This last was especially important because the provinces have jurisdiction over the manufacture, sale, and installation of electrical apparatus while the Dominion has jurisdiction over radio.

A conference in 1938 called by the Department of Transport was attended by provincial government representatives and representatives of the electrical and radio industries. As a result of a request made at the conference, the Canadian Engineering Standards Association undertook to study the problem, and organized a committee of the Canadian Electrical Code, Part IV, to prepare specifications of tolerable limits of interference and methods of measurement. Specifications have been issued for a standard measuring instrument and progress has also been made in establishing standard methods of measurement. The Department of Transport is planning to consider the findings of the CESA in applying the radio-interference regulations.

Consumers' Counsel Division Surveys Bedding Laws

A survey which is expected to help the ASA Committee on Bedding and Upholstery in its work on preparation of American Standards has just been completed by the Work Projects Administration under the supervision of the Division of Consumers' Counsel, Agricultural Adjustment Administration, U. S. Department of Agriculture.

The survey consists of three principal parts: (1) a presentation of the provisions of State laws regulating the manufacture and sale of bedding and upholstery; (2) a summary of Federal and State court cases concerned with bedding and upholstery; (3) a chart together with a summary comparing State sanitation and labeling requirements for new bedding and upholstery.

In order to make comparison easier, the provisions of the State laws have been grouped under seven major topics: Definitions; coverage; restriction on use or sale of certain materials (second hand, contaminated, etc.) and use or sale of finished articles containing such materials; restriction on use or sale of finished articles previously used; tags, labels, seals; exemptions; and administration and enforcement.

The judicial decisions summarized in this survey are classified into Federal court cases and State court cases. They represent the leading decisions of American courts on the subject of bedding and upholstery.

A chart on Sanitation and Labeling Requirements for New Bedding and Upholstery analyzes the State laws in such a way that the similarities and differences between the laws on the points selected can be readily seen.

The survey covers laws and decisions up to January, 1940.

The Sectional Committee on Bedding and Upholstery of the American Standards Association, under the leadership of the National Association of Bedding and Upholstery Law Enforcement Officials, is now taking a letter ballot vote on four proposed American Standards. These cover definitions and tolerances for filling materials, coverings, cotton, wool, feathers and downs, and miscellaneous filling materials. When bedding and upholstery standards are given final approval by the American Standards Association it is expected that these national standards will help in bringing about greater uniformity in the provisions of State and municipal bedding laws.

400 Approved Standards On New ASA List

The American Standards Association announces publication of a new List of American Standards for 1941. In view of the importance of standards and specifications not only for every-day work but to speed up production to meet defense requirements, this particular list of standards will be of unusual interest to industry.

More than 400 American Standards are listed, covering definitions, technical terms, specifications for metals and other materials, methods of test for the finished product, dimensions, safety provisions for use of machinery and for methods of work. They reach into every important engineering field and serve as a basis for many municipal, state, and federal regulations. Six hundred manufacturing, government and user groups have shared in the development of these standards.

These American Standards, developed as they are by the industrial groups themselves working through the American Standards Association, represent the best in current practice. Provisions are made for their frequent review in order to keep them in line with a changing industrial set-up. Many of the standards listed here were brought up to date within the last year.

This List of American Standards for 1941 will be sent free of charge to anyone interested. Requests should be addressed to the American Standards Association, 29 West Thirty-ninth Street, New York, N. Y.

Standards for Consumer Goods Urged in Report to TNEC

STANDARDS for consumer goods were recommended to the Temporary National Economic Committee last month as an important means of bettering the lot of American consumers when Donald E. Montgomery, director of the Consumers' Counsel Division of the U. S. Department of Agriculture, presented his "Recommendations in the Interest of Consumers" to the TNEC. Mr. Montgomery recommended that "steps be taken to assure early, continuing, and effective action for the development of quality standards for consumer goods." In addition, he recommended that Congress create a central consumer agency in the Government to "foster, promote, and develop the consumer welfare of the people of the United States."

The development of quality standards is the one objective upon which all parts of the many-sided consumer movement are definitely in agreement, Mr. Montgomery declared. Various trade groups see in the development of standards a promise of better relationships in their dealing with their customers, possible savings in distribution costs, and a means of protection against the unfair competition of those who misrepresent goods to their customers, he said.

Consumers Need Help of Standards

"To keep up with the great complexity, variety, and novelty which modern industry makes available to them, consumers need the help of standards of description, such as have been found virtually indispensable in the industrial process by which those goods are produced," Mr. Montgomery explained. "I should add—and I want to make this emphatic—", he continued, "that the standards we are talking about are descriptions and nothing more than that; they are not orders issued by anybody to anyone. They do not determine what commodities shall be produced or how they shall be produced. If simplification or improvement in the character of commodities results from the application of standards, that may be a desirable result, but it will be a voluntary one. Standards are not restrictions; they are a language of commerce by which those who wish to do so may transact business with each other on a better informed, more exact, and more satisfactory basis."

Much has already been done to try to promote the development of standards for consumer goods, Mr. Montgomery told the TNEC. The American Standards Association and others have worked at it for years and have made progress, he said. "But I am sure that I speak the mind of all consumer groups and organizations when I say that this progress is not as rapid as it should be, and that Government effectively can, and appropriately should, speed up that progress and make sure that consumers play an effective part in the program."

Recommends Cooperation with ASA

Mr. Montgomery declared that two steps urgently need to be taken as the Government's contribution and outlined his plan for acceleration of the consumer standards program as follows. His plan as outlined calls for cooperation with the American Standards Association. He said:

"First, provision needs to be made for initiating the research and the cooperative procedures which lead to the formulation of standards so that the program will move forward and results will begin to appear. Second, all the resources of Government, and of standardizing associations, and of private laboratories, and of manufacturing and trade associations and consumer organizations need to be drawn upon and mobilized to the service of this program.

"The first step toward standards is laboratory research to ascertain the quality characteristics of a given class of commodity and how they may be described and graded. The next step is the translation of the research findings into the language of a standard. This requires consultation and agreement on the part of all those who make the commodity, distribute it, buy it, and use it. Next, the standard agreed upon should be given legal status through its adoption as a Government standard after public hearing. Then the standard has been created. Thereafter, there is need for education as to the meaning of the standard, promotion of its use, and prevention by an appropriate policing agency of misuse.

"The Federal Government already possesses within its various units considerable resources in laboratories, research personnel, and technicians in various fields of commodity specifications. If they were authorized to do so, and were coordinated to this end, these Governmental units could make valuable contributions to progress in the

development of consumer standards. . . . There are 45 Federal agencies which work in one or more branches of the general field of commodity standards. . . .

"To make these existing resources available for the development of consumer standards, I propose that Congress establish a Consumers Standards Board, composed of persons delegated by the heads of the several Government agencies concerned with the question. Its function would be to initiate the necessary research basic to the drafting of standards for the commodities which it has selected, and to allot funds to the appropriate governmental or non-governmental agencies for the carrying out of that research. Upon receipt of the research reports this board would draft tentative standards and submit them to a designated public administrator. In carrying out these functions the board would be directed to confer with representatives of manufacturing, trade, and consumers, with authority to pay expenses of consumer representatives to enable them to take part in its deliberations.

Would Give Standards Legal Basis

"The administrator to whom the tentative standard is submitted would be empowered to adopt it as a legal standard after notice and public hearing. It has been suggested that before this step is taken the findings and recommendations of the Standards Board be made available to the American Standards Association or other non-governmental agencies equipped to carry out suitable standards procedures. If, then, it were adopted by the American Standards Association or the American Society for Testing Materials or other such agency, that standard could be given legal status by the designated public administrator. This procedure is proposed in order to retain the benefits of voluntary action of trade and consumer groups in the formulation of standards. However, if results were not forthcoming within reasonable time by that means, the further suggestion is made that after a suitable waiting period the public administrator would act on his own initiative to hold hearings and fix a standard, based on the recommendations of the Standards Board.

"It is not proposed that the functions of this Standards Board would supersede the authority contained in the Food, Drug and Cosmetic Act and other legislation for the fixing of certain kinds of standards for certain kinds of commodities, although the Board doubtless would be found serviceable in assisting the standards procedures already provided by law.

"It is rather generally agreed at this time that standards established for consumer goods in new commodity fields should be permissive, not mandatory. Their use in describing commodities offered for sale would not be compulsory, but vendors who use them or purport to use them in the sale of their goods would be required to do so accurately. The Federal Trade Commission Act probably contains all the power that is necessary to police the use of voluntary standards. . . .

"These are the working drawings of two steps which I propose Government take to promote the interests of consumers: provide comprehensive review of Government activities from the consumer viewpoint, and provide a commodity language to aid consumers in getting their money's worth."

Recommends Government Consumer Agency

In addition to his recommendation on standards, Mr. Montgomery proposed "that the Congress create a central consumer agency in the Government under the broad prescription that it shall foster, promote, and develop the consumer welfare of the people of the United States."

"Justification for such action by Congress," he declared, "is found in the fact that although the Government is called upon more and more to control, to regulate, to establish rules of the game, and to make decisions in the economic life of the country, the effect of these proceedings upon the consuming public has not received the attention which it deserves."

"To summarize," he said, "I propose that a central consumer unit be set up in an appropriate agency of Government to promote the interest of consumers in the administration of Government programs; that to carry out these programs it be given access to information and be charged with the duty to advise administrators on the consumer aspects of pending issues; and that it be authorized to publish information on the activities of Government relating to the consumer interests of the population."

Mr. Montgomery's recommendations were based upon his own experience and upon consultations over many years with others inside and outside of Government and were not made as representing the Department of Agriculture, he explained.

NEMA Outlines 1941 Program

The National Electrical Manufacturers Association lists cooperation on American Standards, government specifications, and standards of other organizations, as well as development of NEMA standards as an important section of its program for 1941. This information is given in the new booklet, *What NEMA Will Do in 1941.*

ASTM Committees Plan More Work, Undertake New Research Programs

THE 1941 Committee Week of the American Society for Testing Materials at Washington, D. C., March 3 to 7 was marked by more meetings of the Society's technical committees than have been held in any previous year and by the registration of more than 1,000 materials engineers and testing experts.

Resulting from the discussions will be many new purchase specifications, testing procedures, research data on materials, and other information. Most of the material will be included in the annual reports of the committees to be presented at the Society's annual meeting at Chicago June 23 to 27.

The papers and discussion included in the two symposiums presented during the committee meetings will be issued in special publications during the early summer. The symposiums were on New Methods for Particle Size Determinations in the Subsieve Range, and on Color—Its Specification and Use in Evaluating the Appearance of Materials.

In addition to actions on new and revised standards, to be reported at the Society's Annual Meeting in June, the committees planned expansion of the work they are now doing. They also recommended submittal of certain ASTM standards to the American Standards Association for approval as American Standards.

Rubber

Among the new activities will be those of ASTM Committee D-11 on Rubber Products to be undertaken as a result of discussions at its meetings during Committee Week. Some of these new projects will cover requirements for synthetic jackets for insulated wire and cable, testing of material to be used for battery box containers, and standardization of testing procedures applicable to rubber products manufactured by coating fabrics, such as balloon cloth, draperies, upholstery materials, etc.

The group in charge of specifications for products to protect persons from electric shock recommended that the specifications for rubber gloves (D 120-40) be submitted to the American Standards Association for approval as American Standard. It is expected that these specifications will be considered by the ASA Sectional Committee on Electrical Insulating Materials (C59).

New standards and methods of test and revisions on existing standards will be reported to the American Society for Testing Materials during ASTM Annual Meeting in June

The subcommittee on abrasion tests has decided to undertake work comparing the results obtained with the duPont and National Bureau of Standards' machines to determine if data obtained by one test method can be correlated or converted into the other. The subcommittee is to undertake the investigation of abrasion tests suitable for use in evaluating marine decking compounds.

A cooperative program has been arranged for comparing the results of accelerated aging tests with 80 C bomb temperature and 70 C. Eleven laboratories are to cooperate using a number of different rubber compounds.

A new Subcommittee on Standardizing Methods of Tests Applicable to Rubber Products Manufactured by Coating Fabrics (proofed goods such as balloon cloth, draperies, waterproofing materials, rubber blankets, upholstery materials, etc.) with Rubber and Rubber-Like Materials has been authorized and is being organized.

Standard Now Before ASA

Committee D-11 also took action on standards covering test methods for rubber which are referred to in Specifications for Cotton Rubber-Lined Fire Hose for Public and Private Fire Department Use (ASTM D 296-38). This standard is now before the American Standards Association for approval as a revision of an earlier edition approved as L3-1935. The revision now recommended by Committee D-11 removes the methods of test to separate standards. The committee has gone on record in favor of submitting these reference documents to the ASA for approval as American Standard whenever they become ASTM standards. These reference docu-

ments giving tests for rubber include:

Methods of Sample Preparation for Physical Testing of Rubber Products (D 15-39)

Methods of Chemical Analysis of Rubber Products (D 297-40 T)

Methods of Testing Rubber Hose (D 380-40 T)

Methods of Tension Testing of Vulcanized Rubber (D 412-40 T)

Methods of Test for Adhesion of Vulcanized Rubber (D 413-39)

Method of Test for Accelerated Aging of Vulcanized Rubber by the Oven Method (D 573-40)

Method of Test for Accelerated Aging of Vulvanized Rubber by the Oxygen-Pressure Method (D 572-40)

Steel

Action to revise ASTM standards, which are also approved American Standards, was taken by Committee A-1 on Steel. A change in the Specifications for Steel for Bridges and Buildings (ASTM A 7-39; ASA G24-1939) was proposed to delete sections on eye-bars and to add sections on weldability and reorganization of the strength requirements. A new tentative standard on alloy structural steel which may affect this standard is under consideration.

The Specifications for Blooms, Billets, and Slabs for Forgings (ASTM A 17-29; ASA G9.1-1933) are to be completely revised in a new tentative standard but A 17-29 is to be retained as standard for a year, at least.

Revisions are now under way in this committee on the following flange and pipe standards which have been approved by the American Standards Association:

Forged or Rolled Steel Pipe Flanges for High-Temperature Service (ASTM A 105-39; ASA G17.3-1939)

Welded and Seamless Steel Pipe (ASTM A 53-40; ASA B36.1-1940)

Lap-Welded and Seamless Steel Pipe for High-Temperature Service (ASTM A 106-40; B36.3-1940)

Electric - Resistance - Welded Steel Pipe (ASTM A 135-34; B36.5-1935)

Corrosion

The failure of zinc coatings under certain service conditions has suggested the possibility of a correlation between such failures and the chemical composition of the zinc coating on the failed specimens. Subcommittee VIII on Field Tests of Metallic Coatings of Committee A-5 on Corrosion of Iron and Steel has appointed a section to work with the National Bureau of Standards in developing proper analytical methods before going further in its analysis of zinc coatings on materials now being tested.

This subcommittee on field tests has been asked by the subcommittee on specifications to determine what effect increasing the present aluminum limit of 0.01 per cent in zinc baths for galvanizing structural steel, etc., would have on the atmospheric corrosion resistance of zinc coatings produced from such higher aluminum-content baths. The subcommittee is preparing a number of small hand-dipped zinc-coated sheet specimens with various percentages of aluminum in the coating baths for exposure at one of their test locations. It is hoped that these tests can be started within the next few months.

A new Subcommittee V on Statistical Analysis and Planning of Corrosion Testing is being organized by Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys. This subcommittee will act as adviser to the other subcommittees in the planning of their programs and in the analysis of the data resulting from those programs.

Another new subcommittee is being organized by Committee B-3 to be known as Subcommittee

Industry has welcomed the pamphlet, *Tolerances for Cylindrical Fits*, the last instalment of which is published on pages 98 to 104 of this issue. Evidence of industry's interest is an order for 1,000 copies of the pamphlet from a large aircraft manufacturer for use in a national defense training course. Many other smaller orders have also been received.

The information given in the pamphlet can be used as a step toward better dimensional control, more rapid assembly and improved performance of manufactured products—combined with lowered cost of manufacturing.

Copies of the pamphlet, containing all four parts which have been published in instalments in INDUSTRIAL STANDARDIZATION, January-April, are available from the American Standards Association at 25 cents each. Special prices will be quoted on quantity orders.

VII on Weather. This group will attempt to collect the pertinent data in connection with weather at the various locations where exposure tests are now being carried out. For this purpose the term "weather" includes such things as sulfur dioxide, soot, dew, sunlight, wind velocity, temperature fluctuation, etc. If it is found that data of this kind for specific locations can be correlated with results of exposure tests at these same locations, the subcommittee may undertake the collection of similar data with respect to other locations.

Castings

One of the important subjects discussed at the meeting of Committee A-7 on Malleable Iron Castings during ASTM Committee Week was the demand for quality specifications covering particular applications of these materials. The result was to instruct the subcommittee on cupola malleable iron to start work on suitable standard requirements for malleable fittings.

The Subcommittee on Specifications for Castings of Committee A-10 on Iron-Chromium-Nickel and Related Alloys is undertaking work in cooperation with the Alloy Castings Research Institute and the American Petroleum Institute on studies of the test block for heat-resisting alloys recently made at the Battelle Memorial Institute and their relation to the ASTM specifications for stainless steel castings.

Non-Ferrous Materials

Committee B-5 on Copper and Copper Alloys, Cast and Wrought, plans to organize a new Subcommittee on Tolerances. This subcommittee will cooperate with the standards committee of the Copper and Brass Research Association, acting as a liaison group on dimensional tolerances between producers and consumers of wrought copper and copper-base alloys.

At its dinner meeting during ASTM Committee Week, Committee B-6 on Die-Cast Metals and Alloys considered methods of financing an extension of atmospheric exposure tests on zinc, aluminum, and magnesium alloy test specimens. The committee believes it needs to supplement its previous tests at various locations, extended over some ten years, with information on new alloys. It has appointed a special committee to solicit small contributions from a large number of producers and consumers of this type of casting.

Committee B-7 on Light Metals and Alloys, Cast and Wrought, considered steps it might take to help in overcoming production problems which have arisen because of the great demand for various types of aluminum and magnesium alloys.

It decided to review the specifications for aluminum for use in iron and steel manufacture which now cover four grades. Changes will be made to help in meeting the heavy demand for this type of material.

With reference to aluminum sheet and strip specifications the committee is attempting to help in connection with supply by revising size tolerances in keeping with present production facilities.

In connection with anodic oxidation treatment of aluminum and aluminum alloys for added corrosion protection and abrasion resistance the committee is beginning a program of tests. Samples of various alloys have been treated by different methods and will be tested by various cooperating laboratories.

Building Materials

Committee C-7 on Lime decided to start a series of tests on the various sugar and other methods for determining available lime in order to standardize on a simple and fairly accurate method which can be used by the producer and consumer of lime products.

The committee also authorized a study of the factors which influence the settling of quicklimes and hydrated limes used for chemical purposes.

In order that requirements in the Standard Specifications for Gypsum Partition Tile or Block (C 52-33) may be more in line with those of Federal Specifications, Committee C-11 on Gypsum agreed on modifications which will be offered for immediate adoption as standard.

Committee C-16 on Thermal Insulating Materials plans to enlarge its membership to include those having an interest in thermal insulating materials in the building construction field. Expansion of the committee's scope of activity to cover these materials was authorized recently by the Executive Committee of the ASTM. A subcommittee under the chairmanship of R. H. Heilman, Mellon Institute of Industrial Research, has been studying a number of methods in current use for determining the physical properties of preformed insulation. As a result of this work, proposed standard methods have now been completed for determining the crushing strength and flexural strength of preformed block thermal insulation. Proposed definitions for preformed block insulation and for thermal insulating cement will be submitted to the Society for publication as tentative.

Coal and Coke

During the Committee Week meetings Committee D-5 agreed to withdraw the present Standard Specifications for Foundry Coke (D 17-16) and to dismiss Subcommittee VIII on Foundry

Coke Specifications. These specifications were adopted in 1916 and have outlived their usefulness. The subcommittee after much study concluded that it is not feasible to prepare general foundry coke specifications that will cover current foundry practices.

A special section of Subcommittee I on Methods of Testing was formed to consider methods of expressing tolerances on duplicate determinations when analyzing and testing coal and coke. The purpose of this work is to express such analytical tolerances on a precise mathematical basis in terms of probable error, standard deviation, etc. Need for such precise methods of expressing tolerances in duplicate determinations is required in studies now being made attempting to correlate various chemical and physical properties of coal and coke with their use characteristics.

Electrical Insulating Materials

The group responsible for work on plates, tubes, and rods of Committee D-9 on Electrical Insulating Materials reviewed the Navy Department methods of testing the product uniformity of laminated phenolic sheet. Also, specifications of the Navy Department covering fish paper insulation were reviewed.

Committee D-9 plans to recommend the following to the American Standards Association for approval as American Standards: Methods of Testing Laminated Tubes Used in Electrical Insulation (D 348-39); Methods of Testing Laminated Round Rods Used in Electrical Insulation (D 349-39); and Methods of Testing Shellac Used for Electrical Insulation (D 411-40).

The Sectional Committee on Electrical Insulating Materials (C59) of the American Standards Association also met during ASTM Committee Week. This committee is studying the three standards listed above as well as Methods of Testing Sheet and Plate Materials (ASTM D 229-39) to determine whether they may be acceptable as American Standards. The committee is also considering three NEMA standards recommended by the National Electrical Manufacturers Association on Mica (NEMA 39-55), Laminated Phenolic Products (NEMA 39-57), and Machining and Punching Phenolic Plate (NEMA 39-58) for submittal to ASA.

It was suggested during the meetings of committee C59 that it might be desirable for the American Society for Testing Materials to submit four standards relating to shellac to the American Standards Association. It is expected that the Society will take the necessary steps to submit these standards to the ASA soon. They are: Methods of Sampling and Analysis of Shellac (D 29), Specifications for Dry Bleached Shellac (D 207), Specifications for Orange Shellac (D 237), and Specifications for Shellac Varnished (D 360 T).

Textiles

The subcommittee on Bleaching, Dyeing, and Finishing of Committee D-13 on Textile Materials has recommended that work be undertaken on the effect of finishing materials on the human skin. It plans that any work undertaken on this subject would be in cooperation with other interested groups. Committee D-13 is recommending that Specifications for Textile Testing Machines (D 76-40) and Methods of Testing Wool Felt (D 461-40) be submitted to the ASA for approval as American Standards.

The Subcommittee on Glass Fiber and Its Products of Committee D-13 decided to undertake a study of the essential properties of sizing for glass yarn, including the preparation of methods of testing. This subcommittee has also received a request from the Specifications Section, Bureau of Ships, Navy Department, for assistance in the development of methods of test for glass textiles for marine uses.

Miscellaneous

Committee D-20 on Plastics is undertaking a project to study plastic bearing materials and their frictional properties with a view to developing test methods.

Committee E-1 on Methods of Testing plans to develop data for probable publication in its 1941 report to be presented at the ASTM annual meeting in Chicago covering tension testing of such materials as narrow strip, very thin sheet metals, and metal foils. No standardized requirements for these materials are given in the present standard.

Survey Leads to Changes in Cans for Fruits and Vegetables

The Committee on Simplification of Containers of the National Canners Association made a survey recently in order to study the sizes of cans in use for fruits and vegetables. In this survey the Division of Simplified Practice, National Bureau of Standards, collaborated. As a result, Simplified Practice Recommendation R155-37 for Cans for Fruits and Vegetables has been superseded by a new edition, R155-40, which is now on sale at the Office of the Superintendent of Documents, Government Printing Office, Washington, D. C. Recommended dimensions, capacities, and designated use of the cans are listed.

ASA Receives New Foreign Standards

The Library of the American Standards Association has received the following new standards from the various foreign standardizing bodies. The standards are available for loan by ASA members.

Argentina

Proyecto de Norma para Metodo de ensayo de traccion de aceros a la temperatura ambiente (102-P)
Proyecto de Norma para Metodo de ensayo de plegado de aceros a la temperatura ambiente (103-P)
Proyecto de Norma para Tamices de ensayo (1501-P)
Proyecto de Norma para Tensiones y frecuencia electrotecnicas (2001-P)
Proyecto de Norma para Intensidades normales de corriente (2013-P)

Australia

Trailing Cables for Mining Purposes (C 81-1941)
Nomenclature of Australian Timbers (O 2-1940)
Natural Sour (Prime Lactic) Casein for Glue Manufacture (K 76-1941)
Joiners' Glue (K 77 to 79-1941)

Emergency Standard

Wood Charcoal for Use in Gas Producers for Vehicles and Tractors (E D 3002-1941)

Canada

Construction and Test of Power-Operated Radio Devices —Section A: Inductively Coupled (Transformer) Type (C22.2-1A-1940)
Construction and Test of Extra Low Potential Control-Circuit Wires and Cables (C22.2-35-1940)
Construction and Test of Porcelain Cleats, Knobs, and Tubes (C22.2-69-1940)

Hungary

Szigetelolemezek—Rubens isolants (148)
Vezetek-acelhuzalok—Fils d'acier pour canalisations electriques (149)
Iranyelvek villamosgepok es keszulekok ekozta radio vatalzavarok csokkentesere—Directives pour la reduction des perturbations de radiodiffusion causees par des machines et appareils electriques (156)
Iranyelvek villamosvezetekek okozta radiovetelzavarok csokkentesere—Directives pour la reducation des perturbations de radiodiffusion causees par des conducteurs electriques (157)
Kabelszeru szigetelt vezetekek—Conducteurs isoles sous armure protegee (160)
Foldeles—Mise a la terre (172)
Hajolancok, Peckes hajolanc, Attekintes, Chaines de bateaux, Ceil de chaines a traverse, Aprecu (345)
Hajolancok, Kismeretu peckes lancszem, Alak es meret, Chaines de bateaux, Maillons a etai a petite dimension, Forme et dimensions (346)
Hajolancok, Nagymeretu peckes lanoszem, Alak es meret, Chaines de bateaux, Maillons a etai a grande dimension, Forme et dimensions (347)
Hajolancok, Nagymeretu pecek nelkuli lancszem peckes lanchoz, Alak es meretek, Chaines de bateaux, Maillons sans etai a grandes dimensions pour chaines sans etai (348)
Hajolancok, Lanctoldo szem peckes lanchoz, Alak es meretek, Chaines de bateaux, Emerillons manilles pour chaines a etai, Forme et dimensions (349)
Hajolancok, Merotturesek, Chaines de bateaux, Tolerances (350)
Hajolancok, Anyagminoseg, kivitel, atvetel, Chaines de bateaux, Materiaux, Construction, Reception (351)
Kettos hajokikotobak ontottvasbol, Bitte en fonte (352)
Kettos hajokikotobak folytacelbol, Bitte en acier (353)
Egyszeru hajo-keresztbak, Bitte croisee simple (354)
Kettos hajo-keresztbak, Bitte croisee double (355)

Revised Standards

Hajokotelek, Kenderkotelek, Anyag, kivitel, atvetel—Cordage, Cables en chanvre, Materiaux, Construction, Reception (372)
Samott-teglak es lapok meretei—Briques et plaques refractaires, Dimensions (395)
Iskolai tornacipok—Chaussures de gymnastique (425)

Italy

Unificazione dei diametri normali per la meccanica con riferimento ai numeri di renard

Switzerland

A group of 98 new standards have been received but space does not permit their being listed here. However, a list of the standards and the standards themselves may be borrowed by ASA members.

The standards received by the American Standards Association from foreign countries are available only in the language of the country by which they were published.

New ASTM Method Tells How To Report Water Analysis

A new Tentative Method of Reporting Results of Analysis of Industrial Waters, just issued by the American Society for Testing Materials, meets requirements of understandability, familiarity, convenience, and precision, the ASTM announces. Much time now lost in conversion calculations can be saved if this method is used by all those who make and use water analyses, the Society suggests. The proposed standard includes sections on Definitions; History of Sample; Completeness and Accuracy of Analysis; Hydrogen Ion Concentration; Suspended Solids; Dissolved Solids; Dissolved Gases; and Conversion Factors.

The Tentative Standard has been published before it is formally adopted by the Society for a period during which criticism and comments will be welcomed.

A copy of the new tentative standard can be obtained from the American Society for Testing Materials, 260 South Broad Street, Philadelphia.

ASA Emergency Standard Will Cover Use of Statistics in Quality Control

WORK on a Defense Emergency Standard for applying statistical methods to quality control of materials and manufactured products is now well under way under the new ASA Defense Emergency Procedure. An Emergency Technical Committee, appointed by the chairman of the Standards Council, has already held several meetings and is actively drafting a series of American Defense Emergency Standards. After they are completed, these drafts will be sent to a number of key individuals in different groups for comment.

Members of the Emergency Technical Committee on Quality Control are: H. F. Dodge, Bell Telephone Laboratories, *chairman*; A. G. Ashcroft, Alexander Smith & Sons Carpet Company; W. Edwards Beming, Bureau of the Census; Leslie E. Simon, Ordnance Department; R. E. Wareham, General Electric Company; and John Gaillard, American Standards Association, *secretary*.

War Department Requests Standard

The work on the proposed Defense Emergency Standards grew out of a request by the War Department for the initiation of an ASA project on the Application of Statistical Methods to Quality Control of Materials and Manufactured Products.

With expansion of production, the development of methods for rational control of quality of a product is of increasing interest, the War Department explained in its request. The proposed project was approved by the Standards Council at the ASA Annual Meeting, December 11, 1940, on recommendation of a Special Committee headed by R. L. Jones, ASA Telephone Group. The Council also approved the Special Committee's recommendations that the new project be handled by an autonomous sectional committee, under the following scope: "The establishment of methods, means, and practices for the application of statistics to the specification and control of quality of materials and manufactured products."

Following approval by the Standards Council of the ASA Defense Emergency Procedure (INDUSTRIAL STANDARDIZATION, February, 1941, page 33), this Special Committee further recommended that the new procedure be applied to the work on Quality Control. This recommendation was approved by the chairman of the Standards Council, with the concurrence of the chairman of the ASA Board of Examination which has jurisdiction over this project.

It is understood that after the emergency has passed, the Emergency Technical Committee will function as a Steering Committee to organize a sectional committee to continue the work through the regular procedure of the ASA.

ASA Accepts Toxic Substances As Defense Emergency Projects

With approval by Dr. R. P. Anderson, chairman of the Standards Council, eight toxic substances used in defense manufacture have now been officially accepted by the American Standards Association for the development of American Defense Emergency Standards. These toxic substances are:

Acetone	Manganese
Azides, lead and sodium	Tetryl
Cadmium	TNT
Ether	Xylol

Development of the emergency standards will be carried out by the Sectional Committee on Allowable Concentrations of Toxic Dusts and Gases (Z37). The committee is expected to appoint Emergency Technical Committees to draft the standards, which will then be circulated to the full sectional committee for comment and criticism as well as to other selected organizations and individuals who may be particularly interested. The final drafts, based on the comments received, will be submitted to the Safety Code Correlating Committee of the ASA by letter ballot. When the correlating committee has approved the drafts the chairman of the Standards Council will act for the Council in giving them final approval as American Defense Emergency Standards.

The American Standards Association is hoping that drafts of the proposed standards will receive wide circulation and comment, and invites any one interested to write for copies. The first draft, on Acetone, is now being circulated.

Tolerances for Cylindrical Fits*

by John Gaillard

Mechanical Engineer, American Standards Association

IV. National and International Systems of Fits

A BRIEF review of the developments in this field during the last fifteen years will clarify the important problem that is now before American industry in connection with the revision of the ATS B4a—1925.

Foreign National Systems of Fits

At the time the ATS was approved by the ASA (1925) there existed several other national standards. The principal foreign systems were the British, German, Swedish, and Swiss. The British Standard, still in existence, gives a Basic Hole system[4] and the other national standards just mentioned gave both the Basic Hole and the Basic Shaft systems. All of the national systems referred to were based on unilateral tolerances. Those existing in 1925 on the Continent of Europe have since been replaced by the ISA System which will now be explained.

The ISA System of Fits

In 1926, the International Standards Association (ISA) was founded at a meeting in New York attended by delegates from 18 countries. They discussed a number of technical problems that appeared to offer possibilities for international unification. One of these was the standardization of cylindrical fits. A technical committee on Fits was organized under the procedure of the ISA and a subcommittee consisting of experts representing Czechoslovakia, France, Germany, Sweden, and Switzerland was appointed to draft a proposal. This subcommittee started its work in 1928 and its progress has been regularly reported for the information of ASA committee B4 on Fits, and American industry at large.[5]

To visualize the ISA System, reproductions of six Swiss national standard sheets are given in Figs. 11 to 16, inclusive. These sheets belong to a series published by the national standardizing body in Switzerland when that country decided to adopt the ISA System for a range of nominal sizes up to 500 mm or about 20 inches.

The graphs, Figs. 11 to 16, apply to parts within the size range from 30 to 50 mm, inclusive, or about 1¼ inch to 2 inches, inclusive. The scale of the graphs is in microns. Since one micron is about 0.00004 inch, we have only to multiply the values shown on the left-hand side of the graphs by 0.4, to get a very close approximation to the conversion values in "tenths".

ISA Holes (Grouped by Class)

The black bars in Fig. 11 represent 55 hole tolerances grouped according to the *class* of fit obtained when one of the holes is mated with a basic shaft—that is, a shaft whose high limit is the nominal size, represented in Fig. 11 by the horizontal axis.[6]

The class of fit for which each hole is intended is indicated by a capital letter, see A to Z at the top and bottom of the graph, Fig. 11. There are 21 different classes of fit. (Five letters of the alphabet have not been used as designations. They are: I, L, O, Q, and W.)

There are altogether 6 different grades of holes, numbered from 6 to 11. All of these grades are available for the basic hole **H.** The tolerances corresponding to the six grades are

[4] The British Standard also gives three oversize holes meant "to meet exceptional conditions", but this does not affect the essential character of the system.

[5] Articles on this subject have been published in *Mechanical Engineering*, *American Machinist*, and INDUSTRIAL STANDARDIZATION, during the years 1930 to 1936, inclusive. Additional reports have been submitted to committee B4.

[6] The cross-hatched bars in the graphs, Figs. 11 to 16, representing tolerances *not* meant to apply to fits, should be disregarded in this discussion.

* This discussion was originally presented as an informal talk before the Industrial Standards Group of the Industrial Management Council, Rochester, N. Y. It has been published in four instalments, of which this is the last. The first (INDUSTRIAL STANDARDIZATION, Jan., 1941) deals with general principles in the ideal case where parts are made to exact sizes, no tolerances required. The influence of tolerances on the problem of fits was the subject of the second instalment (February), and the control of fits by means of limit gages of the third (March). The entire article, including all four parts, is now available in pamphlet form at 25 cents per copy.

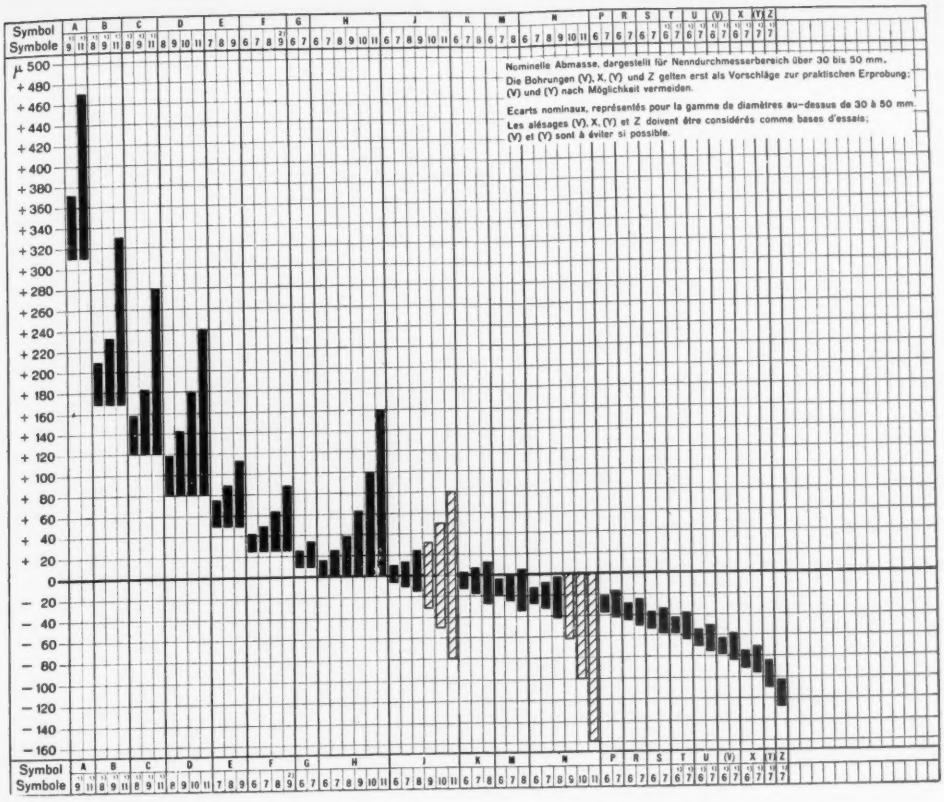


Fig. 11. ISA holes, grouped according to class

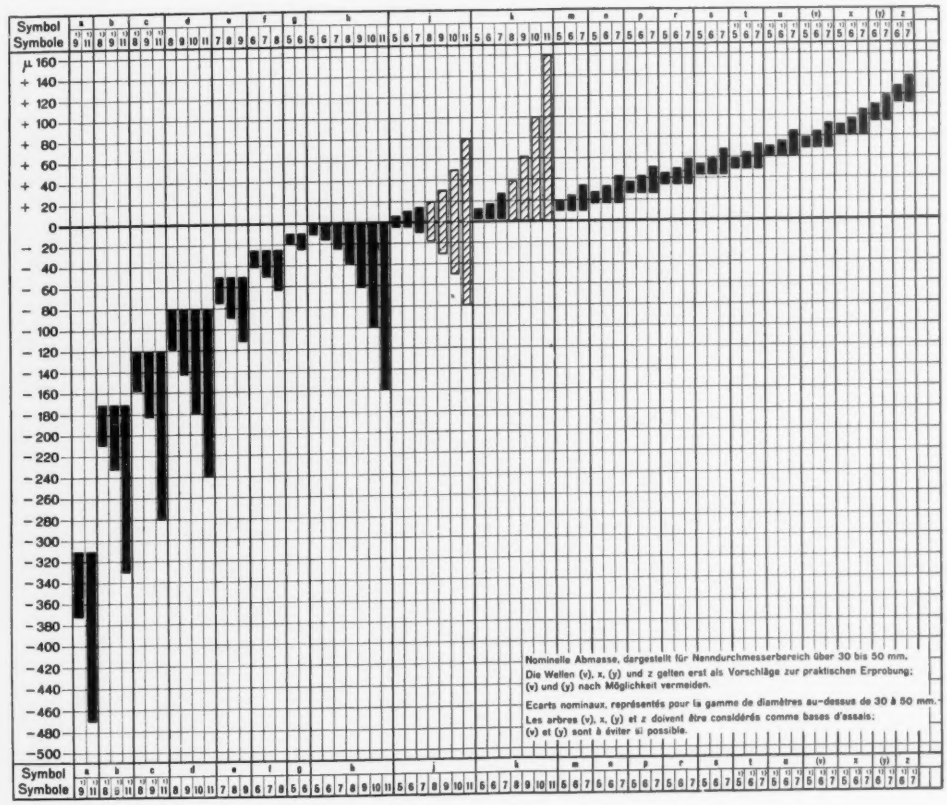


Fig. 12. ISA shafts, grouped according to class

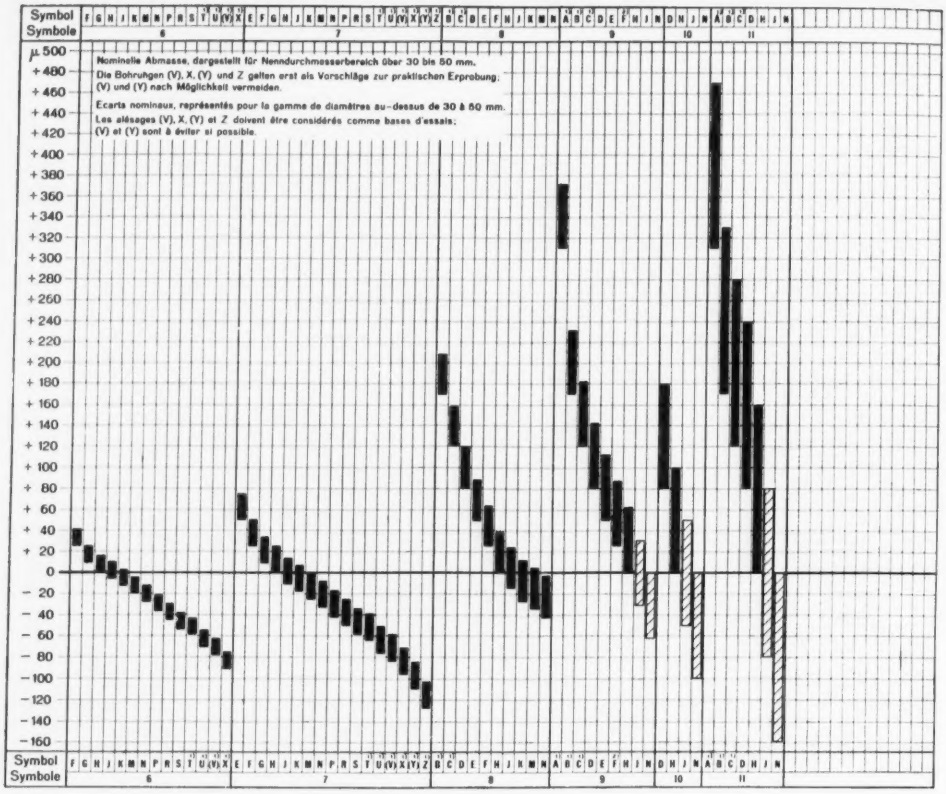


Fig. 13. ISA holes, grouped according to grade

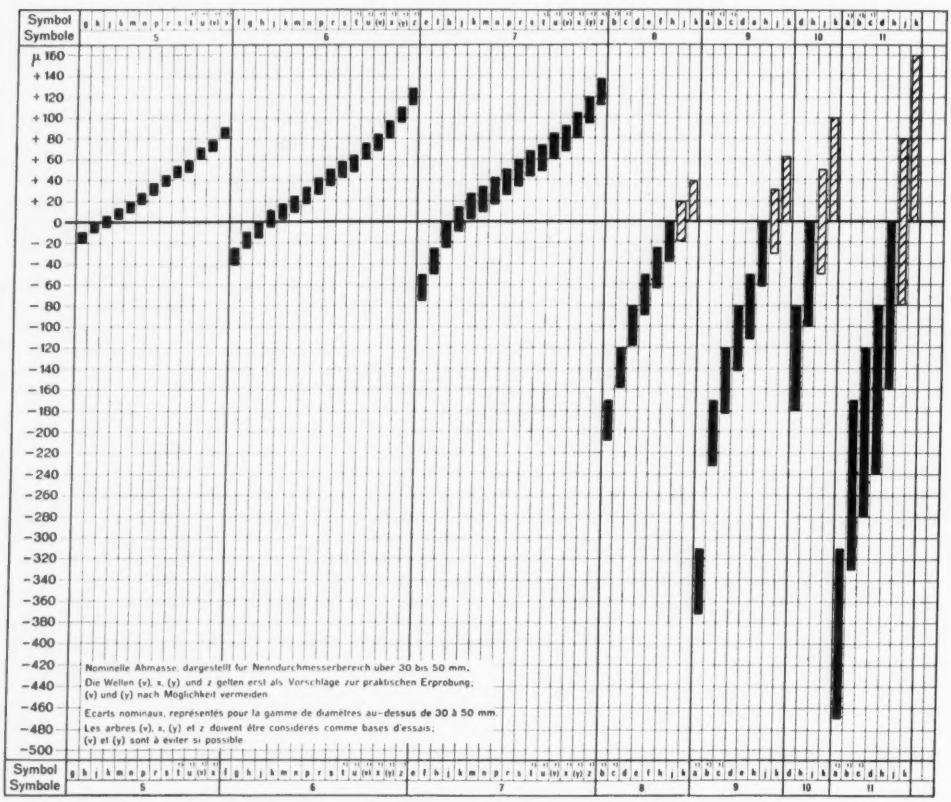


Fig. 14. ISA shafts, grouped according to grade

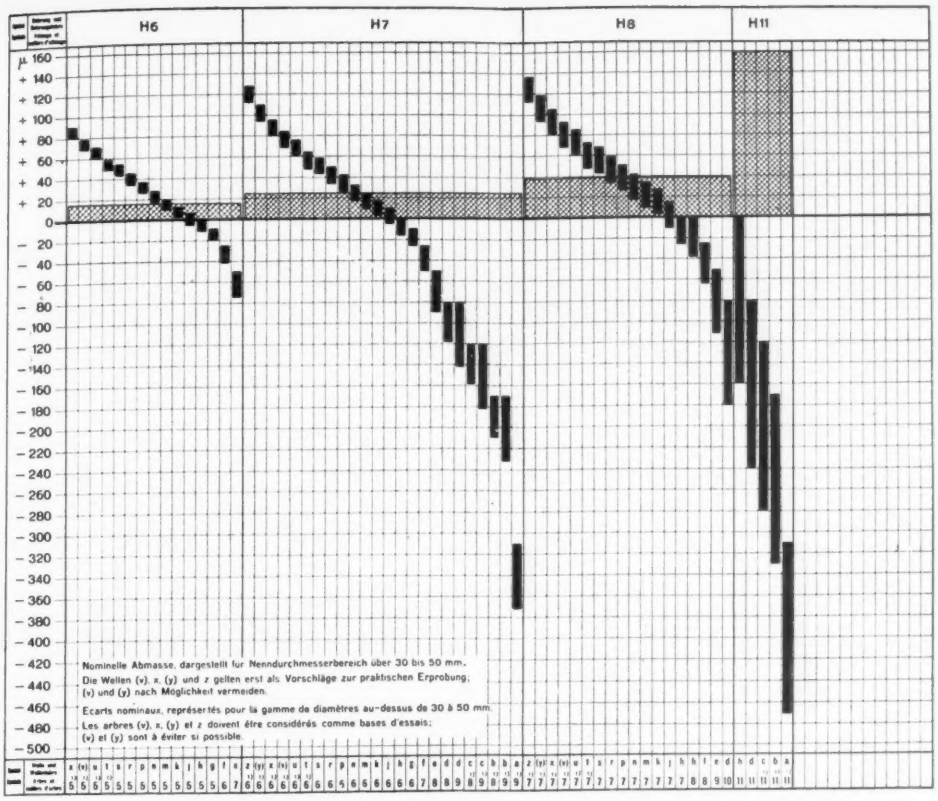


Fig. 15. Recommended ISA fits, Basic Hole System

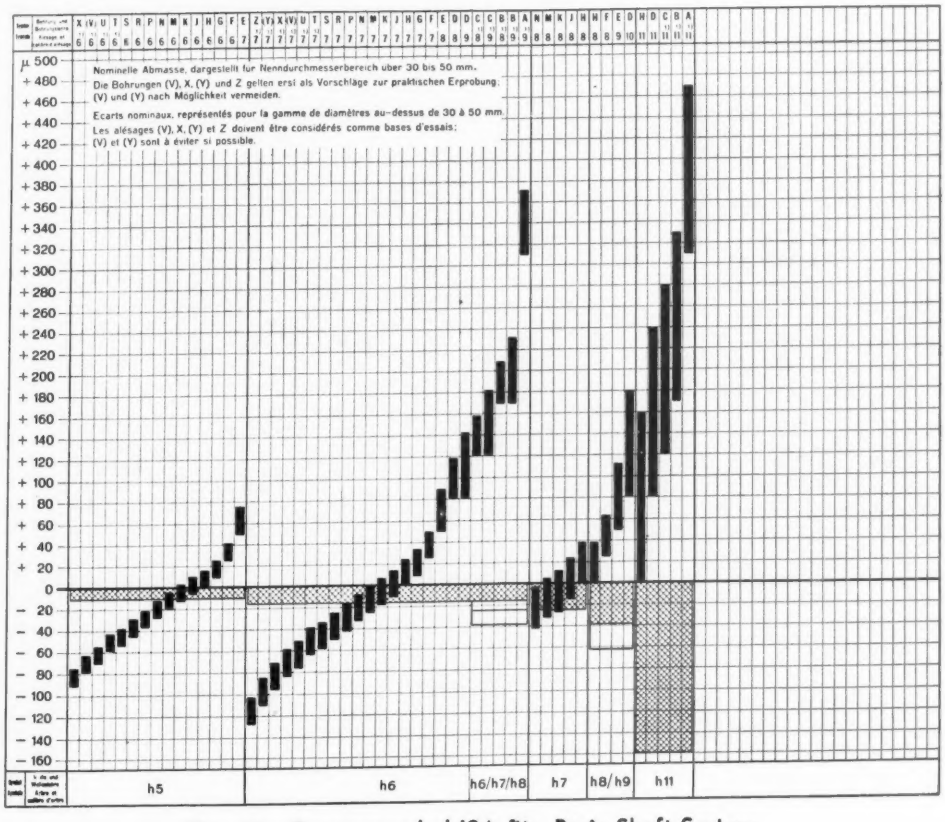


Fig. 16. Recommended ISA fits, Basic Shaft System

equal to 10, 16, 25, 40, 64, and 100 units, respectively. That is, their values belong to the 5-series of Preferred Numbers.[7]

An ISA hole is designated by a symbol consisting of a capital letter followed by a numeral. The letter indicates the *class* of fit (see above) and the numeral indicates the *grade* of the hole.

Holes other than **H** are available in 2, 3, or 4 grades, see graph. For example, on the extreme left of Fig. 11, we find the hole **A** which is available in two grades, **A9** and **A11**. Either of these can be used by the designer if he wishes to specify a loose fit with the largest allowance available in the ISA System. Which of the two he will choose depends on the extent to which the designer wishes to restrict the maximum clearance that may occur.

ISA Shafts (Grouped by Class)

The graph, Fig. 12, gives a similar picture of the 64 shafts available in the ISA System for a given nominal size. Represented by black bars, they are also arranged in 21 groups each of which gives a different allowance with a basic hole—that is, a hole whose low limit is the nominal size represented by the horizontal axis. Each of the 21 groups of shafts is designated by a lower-case letter (**a** to **z**). There are 7 different grades of shafts and the basic shaft **h** is the only one available in all of these grades.

Grades 6 to 11, inclusive, are the same as the six grades used for holes (Fig. 11). In addition, there is one finer grade of shaft (Grade 5), whose tolerance value is 7 units, as against 10 units for the tolerance of Grade 6. (NOTE: If Preferred Numbers had been strictly followed here, Grade 5 would have a tolerance of 6.4 units, instead of 7. The reason for the inconsistency is a purely practical one: 6.4 units would have given a somewhat too small value.)

An ISA shaft is designated by a symbol consisting of a lower case letter indicating the class of fit, followed by a numeral indicating the grade of the shaft. For example, the seven basic shafts are designated by the symbols **h5** to **h11,** inclusive.

ISA Holes (Grouped by Grade)

The diagram, Fig. 13, gives the tolerances of all ISA holes again, but here they are grouped according to their *grade*. The six groups are indicated by the numerals 6 to 11, at top and bottom of the graph.

In each grade, the designer has available a number of holes giving different classes of fit with a basic shaft. For example, on the extreme right are shown 14 hole tolerances, grade 6, varying from the hole **F6** for the loosest fit, to the hole **X6** for the tightest fit.

ISA Shafts (Grouped by Grade)

A similar picture of the ISA shafts is given in the diagram, Fig. 14. Their tolerances are divided into seven groups, corresponding to grades 5 to 11. As said before, ISA shafts are available in a grade 5 which is one grade finer than the highest grade of hole.

Number of ISA Holes and Shafts

Figs. 11 to 14, inclusive, show that for each nominal size there are available in the ISA System, for the purpose of establishing cylindrical fits, 55 holes and 64 shafts (all represented by black bars) which differ either by class, by grade, or in both respects. From these holes and shafts, the designer can take his choice, in establishing the fits desired. He may combine them at will.

Recommended ISA Fits

Originally, the ISA committee on Fits intended to leave the combination of holes and shafts entirely to the designer—in the way this is done in the British Standard. However, designers on the Continent of Europe had become accustomed to having definite fits (hole-shaft combinations) given in their national standards (German, Swedish, Swiss).[8] It appeared that they preferred to have this set-up continued in the ISA System. To comply with this wish the ISA committee has added two groups of Recommended ISA Fits, one in the Basic Hole system and the other in the Basic Shaft system.

To facilitate the discussion of these recommended fits, it may be observed first that the ISA System also gives a standard designating symbol for a fit. This consists of the symbol for the hole followed by that for the shaft, the two being linked together by a hyphen or a slanting line, as follows: **H7-g6,** or **H7/g6.**

ISA Basic Hole System

The graph, Fig. 15, shows four series of fits, each of which is built around a basic hole of a different grade—**H6, H7, H8** and **H11.** Shafts for various classes of fit may be combined with each hole. In most cases, there is only one

[7] After the ISA tolerances had been adopted, the Preferred Number 64 was revised to 63 by international agreement (see, for example, the American Standard, Preferred Numbers, Z17.1-1936). However, to revise the set-up of the ISA System solely to make this change was deemed too academic and the original value 64 was kept.

[8] The ATS B4a—1925 also gives such combinations.

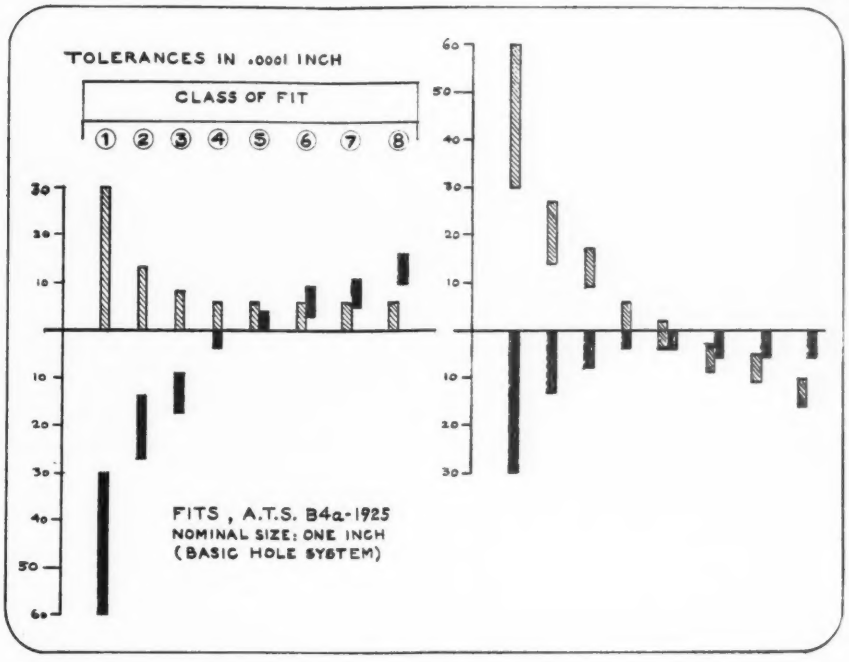


Fig. 17. The eight fits according to ATS B4a-1925 and their equivalent in the Basic Shaft System

grade of shaft available for a given class of fit—see, for example, the combination **H7-g6** for the closest running fit (second group from the left, Fig. 15). However, in some cases, the designer has the choice between two grades of shafts and, hence, between two grades of fit, for the same class of fit—for example: **H7-d8** and **H7-d9.**

Conversion of the micron scale (Fig. 15) to "tenths" will show that, with great approximation, the tolerances on the four basic holes, for the nominal size range from about 1¼ to 2 inches under consideration here, are the following: **H6,** 6 tenths; **H7,** 10 tenths; **H8,** 15 tenths, and **H11,** 63 tenths.

In the **H6**-series, comprising fits of the highest grade, the largest minimum clearance (allowance) is about 20 tenths **(H6-e7)** and the largest maximum interference is about 36 tenths **(H6-x5).**

ISA Basic Shaft System

If a manufacturer prefers to use the Basic Shaft system, he can do so by taking his fits from the five series shown in the graph, Fig. 16. These series, designed around six basic shafts **(h5, h6, h7, h8, h9,** and **h11)** permit the manufacturer to get fits of the same character as those given in the Basic Hole system, Fig. 15.

Other ISA Fits Available

As shown by Figs. 15 and 16, the designer has a wide choice of fits as to class and grade, whether he uses the Basic Hole or the Basic Shaft system. If he does not find what he wants in either of these, he may use a combination between an ISA hole and shaft not listed among the Recommended ISA Fits. For example, if the loose fit **H7-g6** is satisfactory for the designer's purpose, except for the fact that he would like to have less maximum clearance, he may use the combination **H7-g5** instead. This does not appear in the series of recommended fits (Fig. 15), but it is an ISA fit just the same.

ISA Gage Specifications

In addition to hole and shaft tolerances and series of recommended fits, the ISA System gives complete specifications for gages, including their manufacturing tolerances and permissible wear. This has been mentioned briefly before and to go into further details of this matter would lead us too far afield.

Status of the ASA Project on Cylindrical Fits

We shall now take a look at the present status of ASA project B4, Allowances and Tolerances for Cylindrical Parts, and Limit Gages.

The main features of the ATS on Tolerances, Allowances, and Gages for Metal Fits (B4a-1925) are shown in Fig. 17. The eight classes of fit given in this standard are represented on the left-hand side by a diagram of the hole and shaft tolerances applying to mating parts with

a nominal size of one inch. The classes of fit are designated by numbers and, in the standard, also by names (not shown in Fig. 17).

Criticism of ATS B4a-1925

The ATS B4a-1925 gives fits in the Basic Hole system only—a fact that has led to criticism of the standard. The diagram on the right-hand side of Fig. 17 shows eight fits in the Basic Shaft system that are the equivalent of the corresponding fits in the Basic Hole system shown on the left. The Basic Shaft fits are given here only to show how they would look, as an exact "translation" of the Basic Hole fits. But since they do not appear in the ATS and, hence, are not "standard fits", they have not been given any designations, in Fig. 17.

Another disadvantage of the ATS B4a-1925 is that there is only one standard shaft for each class of fit. For example, the limits of the shaft giving a Class 3 fit are "minus 9 and minus 17 tenths". No other shaft gives a minimum clearance of 9 tenths with a basic hole. Therefore, the grade of the Class 3 fit can be improved only by using a hole of a finer grade—for example, the hole of the Class 4 fit. This has a tolerance of 6 tenths, as against the 8 tenths on the Class 3 hole. The cross-combination of a Class 3 shaft with a Class 4 hole is permitted by the standard. However, it would be better if we could improve the grade of the Class 3 fit by keeping the Class 3 hole and using a shaft with a tolerance smaller than that of the Class 3 shaft—the allowance remaining, of course, the same. The reason for this preference is that, in general, it is more difficult to keep a hole within a given tolerance than a shaft, or conversely, if we have to reduce the tolerance on a part, we prefer to do this for a shaft, rather than for a hole. However, in the ATS we cannot follow this preference, since we have only one shaft tolerance at our disposal for each class of fit.

The ATS has been criticized also because the number of classes of fit (eight) is small; it does not give the designer much choice. Whether this matters depends, of course, on the kind of work done by a manufacturing concern.

The range of nominal diameters covered by the ATS is divided into a large number of subranges, for each of which the allowance and the tolerances on the mating parts remain constant. (This arrangement was discussed in reference to Fig. 2.) For example, the size range up to 8 in., inclusive, is divided into as many as 23 steps. It has been claimed that this subdivision is too fine and some companies have actually reduced the number of steps by merging some of the subranges, thus simplifying their tables of allowances and tolerances.

Revision of American Tentative Standard

All of these comments and criticisms were brought to the attention of ASA committee B4 when it was reorganized in 1930, to decide whether the ATS B4a-1925 needed revision and, if so, what changes should be made. On this occasion the attention of ASA committee B4 was called also to the work of the ISA committee on Fits.

Several proposals for a revision of ATS B4a-1925 have been considered since. One of these is the adoption of the ISA System, with the original, metric data converted to inch values (nominal sizes in inches, tolerances and allowances in "tenths"), and possibly with some minor modifications, such as the rounding of nominal size ranges to commonly used inch values, instead of using the odd inch values resulting from exact millimeter-inch conversion. It has also been suggested that since the ISA System was developed exclusively by experts from metric countries (Czechoslovakia, France, Germany, Sweden, and Switzerland), it would be desirable to draft also an original American proposal.

The American Society of Mechanical Engineers, which is the sponsor of the ASA project B4 on Cylindrical Fits, is preparing a presentation of the ISA System for the information of the ASA committee.

Urgent Need of Revision

In the meantime, it has become increasingly urgent to complete the revision of the ATS B4a-1925. Industrial concerns that have come to realize the advantages of using a standard system of fits are left in doubt, at the present time, as to whether they should adopt the ATS B4a-1925 or wait for its revision. The ATS, formally still in force, may be replaced any time now. On the other hand, no prediction can be made as to what the revision will be. As to the ISA System, more and more inquiries are being made on this subject, due to the fact that many American firms are now working to foreign specifications and drawings for products formerly made in metric countries which specify tolerances and fits in accordance with the ISA System.

Most important of all is that American industry, now engaged in the gigantic task of preparing for national defense, must have at its disposal a complete and up-to-date national system of cylindrical fits which is one of the fundamental standards underlying an effective scheme of mass production in the mechanical and related industries.

Yant Succeeds Sayers as Chairman of Committee on Toxic Dusts, Gases

William P. Yant, director of research and development of the Mine Safety Appliances Company, Pittsburgh, was elected chairman of the Sectional Committee on Toxic Dusts and Gases (Z37) at its recent meeting. In addition to its regular work, the committee is now working on allowable concentrations for eight toxic substances which are in use in industries manufacturing materials for the defense program. Dr. C. D. Selby, member-at-large on the committee, was elected vice-chairman.

Mr. Yant succeeds Dr. R. R. Sayers, who resigned because of the increasing pressure of his duties as Director of the U. S. Bureau of Mines. A resolution of appreciation to Dr. Sayers for his work as a member of the committee and as its chairman was voted by the committee:

RESOLVED, That the Sectional Committee on Allowable Concentrations of Toxic Dusts and Gases (Z37) record its appreciation of Dr. Sayers' conduct of its affairs and meetings during his term as Chairman and offer its thanks to him for his efficiency and fairness as its presiding officer.

As Chairman of the committee during the early and difficult period of its organization, and during the formulation and completion of the first four standards which it had approved, Dr. Sayers contributed unsparingly of his time and energy to the promotion and interest of the work.

RESOLVED, That there be spread upon the minutes and communicated to Dr. Sayers, the U. S. Public Health Service, and the American Public Health Association, this expression of warm appreciation of Dr. Sayers' services and the regret of the members of the committee on his resignation as Chairman and as a member of the committee.

Three of the standards prepared by this committee have now been published, covering allowable concentrations for carbon monoxide, hydrogen sulfide, and carbon disulfide, and are now available at 20 cents each.

New American Standard Covers Soldered-Joint Fittings

With the completion, approval, and recent publication of the American Standard for Soldered-Joint Fittings (A40.3-1941), the subcommittee which prepared the standard has completed the first part of its program. The standard covers dimensions of soldered-joint wrought metal and cast brass fittings for copper tubing including detailed dimensions of the bore, minimum specifications for materials, minimum inside diameter of the fitting, metal thickness for both wrought metal and cast brass fittings, and general dimensions for cast brass fittings including center-to-shoulder dimensions for both straight and reducing cast fittings. Due to the variety of methods used for forming wrought metal fittings, the laying length of these fittings (center-to-shoulder distance) is not given.

The pressure and temperature ratings given in this standard are limited by the properties of the 50-50 tin-lead solder which is used to make the joints, the subcommittee explains. The fittings defined by the standard as well as the copper tubing with which they are designed to be used, however, are suitable for use at higher pressures and temperatures than can be safely permitted when this soft (50-50 tin-lead) solder is used. They also have better corrosion-resisting properties than does the solder. The properties given in the standard for this solder are those assigned to it in the National Bureau of Standards' report BMS58, September, 1940.

At the request of the subcommittee, A. R. Maupin, the research associate at the National Bureau of Standards, of the Research Committee of the Sectional Committee on Plumbing and Plumbing Equipment, is now carrying on a research program on a number of other solders. Included in the study are the so-called hard solders which have higher melting points and are known to have greater resistance to corrosion.

When results of this research are available the committee expects to add the new data and new rating tables to the present standard.

Copies of the American Standard for Soldered-Joint Fittings (A40.3-1941) may be obtained from the American Standards Association at 45 cents each.

British, New Zealand, and Australian Draft Standards

The American Standards Association has just received copies of draft standards from Great Britain, New Zealand, and Australia. These are listed below and may be borrowed from the ASA Library by members of the American Standards Association.

Great Britain

Protected Type Dairy Thermometers (CF C 7507)
Studio Spotlight Lamps and Associated Equipment (CF CM 7410)
Laminated Synthetic Resin Bonded Sheet—Fabric Base (CF EL 7258)
Cast Brass Bars (Suitable for Forging) and Forgings (CF NF 7338)
Grading Rules for Structural and Carcassing Timber (CF TIB 7468)

New Zealand

Domestic Electrical Refrigerators (D 1424)

Australia

Plugs and Sockets of the Flat Pin Type—Having ratings up to and including 10 amperes at voltages not exceeding 250 volts (To be No. C 68)

Comments on the British draft for Studio Spotlight Lamps and Associated Equipment may be received at the British Standards Institution until May 5. Comments on the New Zealand draft standard and the draft from Australia are requested until the closing dates of April 30 and July 15, respectively. The ASA will be glad to forward any comments.

New Commercial Standard Grades Hardwood Stair Treads and Risers

A Commercial Standard has just been released which includes grading rules and a minimum specification for three grades of hardwood stair treads and four grades of hardwood stair risers. These rules were drafted and adjusted by the trade with the cooperation of the National Bureau of Standards, the Bureau announced recently.

Hardwood stair treads and risers have been used by the building trade for a great many years, but no nationally recognized standard grading or inspection rules had been available. Realizing the need for such rules, the Hardwood Dimension Manufacturers Association requested the Bureau's cooperation in establishing a Commercial Standard.

The three standard grades of treads and four grades of risers are such that they will harmonize with standard grades of hardwood flooring and solid hardwood wall paneling and trim.

The standard also covers seasoning, workmanship, tread nosing pattern, dimensions, tolerances, nomenclature and definitions, and includes a certification plan, whereby producers may guarantee that their product conforms to or exceeds the requirements of the Commercial Standard.

In order to keep the standard up to date, a representative committee of manufacturers, distributors, and users will from time to time give consideration to its revision.

Copies of the Commercial Standard for Hardwood Stair Treads and Risers, CS89-40, are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at five cents each.

Committee Starts Work On Sheet Standards

Work on the preparation of standards and specifications for sheets and sheeting is now going forward following an organization meeting of ASA Sectional Committee L4, December 13. At this meeting it was announced that the American Hospital Association had accepted sponsorship for the committee and designated E. W. Jones, director of the Albany Hospital, Albany, New York, as chairman. The following representative subcommittee was named to prepare draft standards for consideration by the sectional committee:

Manufacturers—
A. H. Crossman (Utica and Mohawk Cotton Mills)
Magruder Dent (Joshua Baily & Co.)
Harold B. Hoskins (Cannon Mills)
Alternate, Dennis L. Reardon (Riverside & Dan Cotton Mills, Inc.)
Technical Advisor, G. K. Lake (Pepperell Mfg. Co.)
Secretary for Group, Paul B. Halstead (Cotton Textile Institute)

Distributors (Wholesale)—
Eugene F. Humphrey (Butler Brothers)

(Retail)—
Joseph Kelly (Gimbel Brothers, Inc.)
R. B. Orrock (J. C. Penney Co.)

Consumers (Institutional)—
Dewey Palmer (Hospital Bureau of Standards and Supplies)

(Ultimate)—
Pauline Beery Mack (Pennsylvania State College)
Ruth O'Brien (U. S. Bureau of Home Economics)

Government—
E. T. Pickard (U. S. Bureau of Foreign and Domestic Commerce)

General Interest—
A. E. Davieau (U. S. Testing Co.)

ex officio—
E. W. Jones

C. A. Adams Receives 1940 Lamme Medal

Comfort A. Adams, first chairman of the American Engineering Standard Committee (now the American Standards Association), has been awarded the 1940 Lamme Medal by the American Institute of Electrical Engineers. Mr. Adams, who is consulting engineer of the Edward G. Budd Manufacturing Company, Philadelphia, received the medal "for his contributions to the theory and design of alternating current machinery and his work in the field of electric welding." The medal and certificate will be presented to Mr. Adams at the annual summer convention of the Institute in Toronto, June 16 to 20.

Mr. Adams held the position of chairman of the AESC, which corresponds to the present office of president of the American Standards Association, from 1918 through 1919.

ASA Standards Activities

Approved Standards Available Since Publication of Our March Issue

Wrench-Head Bolts and Nuts and Wrench Openings (Revision of B18.2-1933) American Standard	B18.2-1941	65¢
Hard-Drawn Copper Wire (Revision of H4.2-1940) American Standard	H4.2-1941	25¢
Medium Hard-Drawn Copper Wire (Revision of H4.3-1940) American Standard	H4.3-1941	25¢
Accident Prevention Signs American Standard	Z35.1-1941	35¢

Standards Approved Since Publication of Our March Issue

Northern White Cedar Poles (Adv. of 05b1-1931) American Standard 05.1-1941

Western Red Cedar Poles (Adv. of 05c1-1931) American Standard 05.2-1941

Chestnut Poles (Adv. of 05d1-1931) American Standard 05.3-1941

Southern Pine Poles (Adv. of 05e1-1931) American Standard 05.4-1941

Lodgepole Pine Poles (Adv. of 05f1-1933) American Standard 05.5-1941

Douglas Fir Poles (Adv. of 05g1-1933) American Standard 05.6-1941

("Adv." indicates advancement from American Tentative Standard to American Standard.)

Abbreviations for Scientific and Engineering Terms (Revision of Z10i-1932) American Standard Z10.1-1941

Standards Now Being Considered by Standards Council for ASA Approval

Manhole Frames and Covers for Subsurface Structures A35.1

Reinforced Gypsum Concrete A59

Keyways for Holes in Gears B6.4

Cast-Iron Pipe Flanges and Flanged Fittings, Class 250 (Revision of B16b-1928)

Gage Blanks CS 8-41 (Revision of American Standard B47-1933)

Safety Rules for the Installation and Maintenance of Electrical Supply Stations, Part I of the National Electrical Safety Code C2, Part I

Installation and Maintenance of Electric Utilization Equipment, Part 3 of the National Electrical Safety Code C2, Part 3

Electric Fences, Part 6 of the National Electrical Safety Code C2, Part 6

Protection of Structures Containing Inflammable Liquids and Gases—Part 3 of Code for Protection Against Lightning (From status as American Tentative Standard to American Standard) C5, Part 3

Commercial Standards for Sun Glass Lenses (CS 78-39; CS 79-39)

Cotton Rubber Lined Fire Hose (Revision of American Standard L3-1935)

Proposed American Recommended Practice for the Use of Explosives in Anthracite Mines M27

Safety Code for Grandstands Z20.1

Public Approval and Certification Procedures Z34

Draft Available

Threaded Cast-Iron Pipe for Drainage, Vent and Waste Services A21 and A40

New Projects Being Considered

Attachment Plugs and Receptacles

Domestic Electric Flat Irons

Fastness of Colored Textiles

Household Electric Ranges

Spray Solution Used in Connection with Spray Systems for the Prevention of Offset on Printing Presses

Water Heaters

Defense Emergency Standards

Standards Under Way

Application of Statistical Methods to Quality Control of Materials and Manufactured Products Z1

Allowable Concentration of Acetone Z37

Allowable Concentration of Azides, Lead and Sodium Z37

Allowable Concentration of Cadmium Z37

Allowable Concentration of Ether Z37

Allowable Concentration of Manganese Z37

Allowable Concentration of Tetryl Z37

Allowable Concentration of TNT Z37

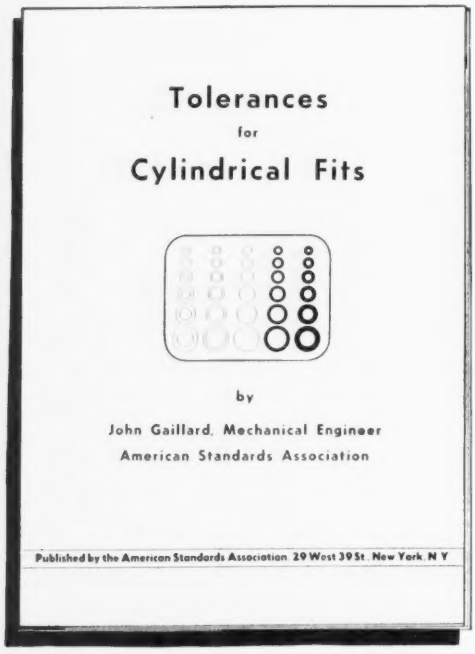
Allowable Concentration of Xylol Z37

New Project Being Considered

Accuracy of Engine Lathes

A Primer of Cylindrical Fits

24 pages – 17 graphs – 25¢ a copy



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INDUSTRIAL STANDARDIZATION
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The Role of Standards in the System of Free Enterprise

by Howard Coonley[1] and P. G. Agnew[2]

A study of voluntary standards as alternative to Legislative and Commission control. Prepared by Request of the Temporary National Economic Committee.

INDUSTRIAL and business matters have come to occupy the center of the governmental stage. It is said that three-fourths of present day legislation deals with business problems. Our courts are crowded with masses of these problems, a large part of which are too technical for them to handle well. The almost innumerable commissions which have been created solely to deal with such questions are equally crowded.

Fundamentally, these problems, which arise from economic struggles within and between industrial groups, involve the adjustment of claims of "rights" and the infringement of "rights" which are continually being put forth in the clash of conflicting economic interests. These problems are increasing in number, variety, and importance with the economic and social changes which have been taking place with increasing rapidity since the first world war.

Will these problems be handled in the future primarily by governmental agencies, or will they be handled in large part by voluntary, cooperative methods under industrial leadership?

One phase of this far-reaching question—whether the authority of federal administrative agencies should be curtailed—has become the subject of widespread controversy. It has been debated extensively in Congress, and it is the subject of a recent extensive report of the Attorney General's committee on the matter.

It is the purpose of this paper to outline some of the concrete accomplishments of the voluntary, cooperative method in the field of standardization, and to examine the general trend.

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The importance of standardization in the national economy and as an instrument for the solution of innumerable problems and difficulties which would otherwise grow into industrial, social and political controversies and dislocations, and therefore liable to become matters of legal regulation, is not generally understood. While it is generally recognized that standardization is essential to mass production, and that it has been extensively used for this purpose by many American manufacturers, most business leaders apparently regard it as a purely technical matter which has only minor significance. Hence it is desirable to examine the standardization method, how it operates as a control, and to compare it with the legislative method, and the method of commission control.

The Consensus Principle

It is a commonplace that law, to be effective, must either be based upon thoroughly established custom, as was the common law, or it must be based upon a common understanding and a common purpose of the great majority of those concerned. Effective law is but one type, though an important one, of a real consensus, or at least of a real acquiescence, which means a common understanding, common purpose, and common consent.

Industrial customs and trade practices, or at least the more important of them, are, in a very real sense, industrial "law" no less than are statutes and the common law. Often more potent than much of the legislation on the statute books, they constitute a powerful system of controls which become generalized "law."

Most of these controls have come about by more or less unconscious evolutionary processes, but more recently they are being brought into existence in innumerable instances by deliberately planned, cooperative effort. As typical of these conscious, cooperative "law-making" processes there may be mentioned:

The numerous codes of ethics that have been adopted by commercial, industrial, and professional associations. While these have fallen far short of enthusiastic predictions made for them a few years ago, chiefly because they have not been sufficiently specific to serve as criteria in adjusting individual cases, they have attained to some importance.

The rules and principles laid down by "industrial czars", which become mandatory rules governing important relations within the group concerned, for example in professional baseball and in the moving picture industry.

Principles and working rules governing relations between employers and employees, developed by such means as "impartial chairmen", direct negotiations between employers, and various types of labor organizations.

The voluntary rules developed by business groups under the trade practices conferences of the Federal Trade Commission.

Much of the work of the trade associations.

Rules and machinery for the arbitration of commercial disputes. This method is in wide use as a substitute for litigation.

The standardization movement.

Most of these are based essentially, though with many variations, upon the simple process of the various parties at interest facing each other, and the common problems, across the council table, developing the facts, and sticking to the problem until agreement is reached upon the principles and the lines of action to be followed.

Standardization

Standardization is the establishing by authority, custom, or general consent, of a rule or model to be followed. In its broadest sense, it applies not only to such matters as weights and measures and material objects, but it permeates most fields of human activity. Folk-ways, taboos, moral codes, ceremonies, educational procedures, social and business customs, industrial practices, even language, are all forms of standardization. The main use of the term standardization is, however, in connection with technology, industry, and business, their products and processes.

Every industrial plant is carrying on standardization of its own products and processes, and its competitive success depends largely upon how well it has studied and solved these problems. Standardization within the plant has been the essential factor in the development of mass production—which is the most important contribution which this country has made to the development of industry.

Some of the more important phases of the movement have to do with dimensional standardization to secure interchangeability; concentration on the optimum number of types, sizes and grades of products; specifications as a basis of purchase; methods of making acceptance tests for materials and apparatus; safety codes for the protection of workmen; building codes; traffic standards; nomenclature, definitions of terms commonly used in specifications and contracts.

All of these are matters which are involved in

the relations between buyer and seller, and between competitors, and hence frequently become subjects of litigation in the courts, and of adjustment through other arms of government, particularly commissions and administrative offices. The purpose is not so much to settle controversies as to simplify and clarify matters so that controversies shall not arise.

For example, loose phrases in describing products, such as, "all materials shall be of best commercial quality", and "good workmanship shall be required throughout", which are even yet frequently used in contracts, are but invitations to the courts. In a wide range of products, such loose phrases are giving place to definite, clear-cut specifications, which may be interpreted in the acceptance or rejection of material without danger of misunderstanding by any competent engineer or testing laboratory.

The purpose is to set forth so clearly the technique by which acceptance tests are to be made that any competent inspector can determine readily and definitely whether the material comes up to contract, or guarantee, or not.

Often in commercial practice things which at first seem extremely simple turn out to be not so simple. What could seem simpler than to decide whether a piece of shafting is 2 inches in diameter? Yet, if nothing more is specified, a buyer may attempt to reject the material, claiming it inaccurate, no matter how accurate it may be, since it is impossible to make a shaft exactly 2 inches in diameter on account of unavoidable inaccuracies of workmanship. On the other hand the seller may attempt to supply material so inaccurate as to be unusable, asserting that it is "commercially accurate." The solution consists in agreeing upon just how many thousandths of an inch departure from the ideal size shall be allowed for unavoidable inaccuracies of workmanship under normal conditions of commercial production. (The amount thus allowed is technically known as the "tolerance".)

Standards as Definitions

Another important line of activity which tends to reduce the work of the courts is in connection with definitions of technical terms used in specifications and contracts and in general industrial transactions. To realize the importance of this, one has but to recall that a large part of the civil cases with which courts deal hinges upon the exact meaning of words and phrases.

As a matter of fact, a large part, perhaps the greater part of standardization, is essentially agreement on definitions. When we agree on specifications for cement we are really agreeing on what we mean by cement, so that we may telegraph, "Send one thousand barrels of cement according to specification", with the full assurance that there will be no misunderstanding of the requirements.

The same is true of methods of test, of grades and grading rules, and of methods of rating machinery and apparatus. It took a vast amount of technical study and many years of negotiations before a "10 horse-power motor" had the same meaning when used by competing manufacturers.

All buying and selling in which goods do not come under the actual eye of the buyer must necessarily be based upon some sort of standard. Most such standards are unwritten, simple, and crude, often being no more than a two-party understanding such as, "Like the one I bought of you the last time". At the other extreme, all of the great basic commodity markets are dependent upon standards which are, in most cases, well worked out, are nationally accepted and used, and may even be subject to legal definition. In the absence of such standards, the buyer would himself have to judge the wheat, corn, cotton, or copper with his own eyes. A safety standard defines just what hazards shall be covered by the safety features of a machine, or by safe practices in an operation. In each case a standard enables buyer and seller, or the parties to any other undertaking with which the standard deals, to speak the same language.

It is readily seen that all these features of the standardization movement partake of the nature of effective human law in its generic sense, that is, of principles of conduct, based upon a sufficiently broad consent or acquiescence of the groups concerned to assure general compliance with them.

Standardization Methods and Machinery

Most standards have come about through a more or less unconscious evolutionary process. Nearly all standards were developed in this way until within the last hundred years.

The conscious process of standardization in industry was first applied to engineering matters, but has been extended to foods and other agricultural products, in fact to innumerable products of farm, forest, mine, and sea. It helps to channel these materials through the many stages of manufacture. It has been concerned predominantly with producer goods.

There is an interesting analogy between this earlier growth of the standardization movement, largely unconscious, and the development of the fundamental principles of Anglo-Saxon law through the common-law process, which was unplanned and largely unconscious.

The standardization movement has been slowly systematizing its machinery and standardizing its own methods. In the past most companies have handled these matters in what may be termed an

unconscious way, implicitly as part of other activities, following the lead of other companies, etc., without clear-cut analysis or organization for the problem.

Group Standards

The great growth of company standardization and mass production during the last half of the nineteenth century gave rise to group standardization which, with a few notable exceptions, has been a development of the present century. There are literally thousands of such group standards, most of which have been developed by technical societies and trade associations.

The present extensive use of electric motors and lamps has been made possible by collective standardization of such fundamentals as voltages and frequencies, and of such details as the interchangeability of lamp bases and sockets.

Probably the most important of all group standards is that of the standard gage and the system of interchangeable brakes and coupings, which has made possible interchange of rolling stock between railroads. Such interchange is necessary to our national railroad transportation system, upon which our whole economic and industrial structure rests.

National Standards

Just as standardization by individual companies led to standardization by groups, so group standardization has led to national or intergroup standardization among industries as a whole. In this, technical societies and trade associations play the same role as do the individual companies in group standardization.

The methods used in formulating group, or association standards are very simple, being essentially committee methods. Customarily a standard is issued only when supported by a majority so substantial as to approach unanimity—almost never on a mere majority vote as so frequently happens in legislatures. Generally, final action is by the governing board of the association, but not infrequently it is by vote of the entire membership. Most of the more experienced associations have safeguarded their procedure to assure the most thorough consideration of the proposed standard before its promulgation.

Necessarily, national standardization requires the correlation of the work of the interested groups through a national clearing house agency. At the beginning of the present war, there was such a national body in each of twenty-six countries, including all of those countries which are highly developed industrially. All but one of these have been organized during or since the World War.

Our own national body, the American Standards Association, was organized in 1918. It is a federation of 73 national organizations, composed of seven departments and three other major agencies of the Federal Government; thirteen engineering and professional societies; and fifty national trade associations, including most of the heavy industries that are active in standardization work.

Developing a Consensus

The chief function of the Association is to provide the systematic machinery through which all the groups concerned with any particular standard participate in its development.

As an example of the standardization method of getting a national consensus let us choose a specialized but relatively simple industrial problem, the protection of workmen in the use of grinding-wheels. What are reasonable provisions for safety?

The work of formulating a safety code on the subject was carried out by a joint committee made up of representatives of all interested groups; the manufacturers through their national trade association; state commissions having regulatory authority over safety matters in the industries, or charged with the administration of accident compensation, through their national association; employing groups which are users of grinding-wheels, through their trade associations; casualty insurance companies through their two national organizations; the workmen whom the code is designed to protect, the representation being arranged through the United States Department of Labor upon nomination by the craft organizations concerned; national engineering societies; technical bureaus of the Federal Government; and independent specialists.

In all, seventeen national organizations are represented on the joint committee, which has thirty members. After two years of painstaking work, unanimous agreement upon a complete code was reached. This was not accomplished, however, without encountering some serious difficulties and differences of opinion. Through patient and conscientious effort a solution of all these problems was found.

The code covers the general safety requirements to be met in the construction, care, and use of grinding-wheels. Its authoritativeness is recognized by the industries concerned with their manufacture and use; all state regulatory bodies that have rules on the subject have adopted the code as their own regulations; and casualty insurance companies use it in recommendations to their insured. It has, in fact, become "the Bible" of the industry.

The code is kept up-to-date by revisions as new developments occur.

The backbone of the regulations of the various

state governments for the protection of workmen consist of fifty such safety codes. Each code has been developed by the same general process and with the same care, through systematic cooperation of all interested groups. After substantial unanimity is reached and registered by action of the joint committee responsible for any particular code, the code is formally certified as the "American Standard Safety Code" for grinding wheels, or for punch presses, as the case may be. This is done by the central organization which serves as a clearing house or means of systematic cooperation in this national industrial standardization movement—the American Standards Association.

A safety code has been chosen as an illustration, not only because of its more direct legal implications, but because of the diversity of the interested groups.

Work on other types of standards is carried out by the same general method. The groups concerned with commercial standards such as specifications, grades, and dimensional standards, usually come under four categories,—producers, consumers, distributors, and independent experts. The number of groups interested in any particular project is surprisingly large, usually from ten to twenty in number. For example, twenty national organizations are participating through accredited representatives on a committee developing a series of standards for bolts, nuts, and rivets; thirty-two are on a committee on pipe flanges and fittings, and thirty-three on a committee on specifications for galvanizing. Even in so specialized a subject as railroad ties, twelve national organizations participated.

The Human Element

In standardization work the human element is far more important than is generally realized. In setting up standards, the human difficulties are usually much more serious than are the technical ones.

On the other hand, one of the chief functions of standards is to remove conditions which lead to controversies. As has been indicated, the lack of adequate standards is a prolific cause of controversy—parts that do not fit, supplies and materials that prove unsuitable because they have not been properly specified, goods that do not live up to sales representations. Such transition-point difficulties often result in feelings of resentment or of frustration on the part of the personnel involved, and thus give rise to controversies—often deep-seated ones. Indeed a goodly proportion of present-day industrial standardization, such as that carried on by the national standardizing bodies, is undertaken in the first instance to remove controversies. These controversies are usually resolved, or at least greatly mitigated, by the introduction of standards which solve the mechanics of the difficulty.

Most cooperative work on standards is undertaken before controversies reach an acute stage. This, however, is not always the case. An example will illustrate the spirit in which such situations are approached.

Some years ago the gas industry proposed to the American Standards Association that there should be national specifications for cast iron pipe. When the manufacturers were approached they said that it would be useless to talk with the engineers of consumer companies who were impracticable theorists. The engineers in turn said that it was hopeless to try to cooperate with the manufacturers who had been working off inferior pipe on them for a dozen years and whose willingness to live up to specifications they doubted. It was a year before it seemed safe to invite them to sit down in the same room to talk things over. After much talk they agreed to develop new specifications cooperatively. A wise and experienced engineer agreed to take the chairmanship of the technical committee, but only upon three conditions:

1. They must agree to agree upon what they did agree upon and what they did not agree upon. That is, they must first agree upon the exact point at which the road began to fork. This was done, and agreement was reached upon what the moot questions were, one of which was the accuracy of a certain formula.

2. They must agree upon why they disagreed upon these moot questions. After long discussion they decided that there were insufficient known facts to give the answer, and hence one man's opinion was as good as another's.

3. They must decide upon what they were going to do about it. The final result was that the manufacturers raised some $70,000, which was expended in large part under the general direction of the engineers, and the necessary facts were obtained. With the facts at hand, the controversies disappeared.

The Three Fundamentals

This also illustrates three principles that are followed by the American Standards Association in order that a consensus may be established in the case of each standard. First, every group substantially concerned with a standard has an inherent right to participate in deciding what the provisions of the standard shall be, so that the standard shall represent a true national consensus.

Second, the questions are broken down into parts small enough so that each part can be handled by a committee made up of representa-

tives of the groups concerned. Such committees are like a legisalture, but organized along industrial instead of geographic lines.

Third, decisions are not made by simple majority vote, but every effort is made to thresh matters out so thoroughly that a decision is reached which is unanimous or nearly so.

An idea of the extent to which the national stage of the movement has developed is given by the fact that over 500 national organizations, industrial, technical and governmental, are cooperating under the auspices of the American Standards Association on some 600 projects, 425 of which have been completed and issued as approved standards. Three thousand men and women are serving on its committees. Only a very small part of the possible field has, however, yet been touched.

Industry-Government Relations

It has often been suggested that in this standardization work, an ideal relationship between industry and government has been developed, namely, that the government departments participate in an undertaking on precisely the same basis as that of any other organized technical, industrial, or consumer group. This means that they participate in proportion to their direct concern with the problem in hand, and to the extent that their technical resources enable them to contribute to the solution, rather than by assuming the direction of the whole undertaking. Fifty bureaus of the Federal Government are officially represented on American Standards Association committees.

Comparison of the Common-Law, Statute-Law, and Commission Method with the Standardization Method

It is instructive to compare these cooperative methods that have been developed in standardization work with the common-law and the statute-law method of arriving at a national consensus.

To see how impossible it would be for the common-law process to work under the rapidly changing conditions of modern industry, one has but to consider a simple case of the common-law process, for example the rates at an old English inn. A traveler, dissatisfied with the charge demanded by his innkeeper, might have recourse to a court. Through long series of decisions of many cases in many courts, each decision serving as a precedent to be cited in other cases, there had early emerged one of the principles of the common law, namely, that the charges in such cases must be reasonable—and reasonable rates had come to be defined as the rates customary in inns of that class. As a part of this evolutionary process of law-making, a regular machinery had been developed for determining what was customary, namely, the testimony of inn keepers and of travelers as to what rates actually had been charged in specific cases.

The common-law has been one of the strongest and most fundamental forces in Anglo-Saxon civilization. Its slow, evolutionary growth made possible so perfect an adjustment to the conditions of the civilization with which it developed, that few forms of social control have exceeded it in power and effectiveness. Perhaps only the control exerted by folk-ways has been more powerful. The method of its growth was closely akin to the slow, remorseless process of natural selection by which nature arrives at types. The common-law method did arrive at a workable consensus, however painful and costly to the individual the grinding of its slow evolutionary process.

The statutory method has in large measure replaced the common-law method in the making of laws. The principal reasons for this have been: the necessity of more rapid adjustment to meet changing industrial conditions; the need for greater clearness and definiteness than was possible in common-law; and the attempt to avoid the enormous costs, human and economic, of the older method.

To reach a national consensus through the statutory-law process is an extremely slow and difficult matter. It is all the more so on account of the fact that legislation on most industrial matters falls within the jurisdiction of the legislatures of the forty-eight states, even though Federal jurisdiction has been enlarged through recent court decisions.

Since few, if any, members of a legislature have adequate knowledge of such a problem, the initiative and the general direction of legislative movements of the kind may be in the hands of interested people outside the legislature—in short, in the hands of the lobby. In state after state the question is fought out before legislative committees by those groups sufficiently interested and alert to participate.

In the legislative mill many specialized problems may become involved in the game of partisan politics. In nearly all cases in which the legislation deals with technical or specialized problems, the overwhelming majority of people are necessarily misinformed both of the existence of the problem and of the attempted legislative solution. To a large extent the same is true of most of the legislators themselves.

With such conditions in each state, anything approaching national uniformity becomes extremely difficult, often impossible. The experience of the National Commission for Uniform Legislation, which is an official body, has shown that even in the case of legislation which meets

with general favor, at least ten years are required to attain uniformity in the more important commercial states.

The legislative method, in short, is not a suitable one for the solution of innumerable specialized and more or less technical problems that arise in the development of industry and business. This does not reflect upon either the ability or the probity of legislators as such, any more than the statement that hammer, chisel and saw are not suitable tools for the making of watches reflects upon either the ability or the probity of carpenters as a class.

Flexibility of the Standardization Method

It is evident that statute law cannot keep pace with industrial progress. On the other hand the standardization method can do so. For example, a year after the national safety code for grinding wheels was first issued, there were two important accidents following developments that could not be foreseen during the formulation of the code. Within a few months the necessary researches had been carried out, and provision to take care of the new condition was under way.

In contrast to this flexibility is the rigidity of legislative enactment. Years ago the state law of Pennsylvania laid down in detail how blasting in coal mines is to be conducted. Research has developed an improved technique which not only reduces the life hazard in the mining of coal but makes possible very definite economies in production. Yet the introduction of the safer and more economical technique is prohibited by the law.

For such reasons, the industrial states are more and more handling such specialized industrial matters as come under legal control through regulatory commissions rather than through legislative enactment. Many experienced commissions are following a policy of getting all the interested groups together to agree upon a solution, and then formally ratifying this solution. A case in point is the reliance placed upon the program of national safety codes by the state industrial commissions. Another extremely interesting example is in the "trade practice conferences" of the Federal Trade Commission, in which the industry agrees upon trade practices, subject to the ratification of the Commission, and which then become criteria of fair and unfair trade practices.

Controversies between industrial groups frequently develop in standardization work just as they do in legislatures, but are practically always on what appear to the contesting groups as real issues. The work is not often bedeviled by anything corresponding to the partisan game of using real issues as pawns for ulterior stakes.

Solution Rather than Compromise

A far more important advantage over political methods is that generally these controversies are threshed out, often with the aid of research, until a reasonable solution, in contra-distinction to mere compromise, is reached. It is in contrast to the frequently bemoaned fact that so large a part still goes by the royal road of issuing decrees—for decrees they are, whether issued by executive, court, commission, legislature, or popular vote—instead of seeking the facts, and through them, a solution which will command a consensus. As is so frequently remarked, questions "settled" in this way often do not stay settled because they have not been solved but only decided.

By thus constantly striving for *solutions*, the standardization method tends to get down to fundamentals, instead of being content with superficial patchwork which all too often characterizes political methods. This difference is well illustrated by building codes. For many years it has been the custom of a number of industries in the building materials field to lobby before city councils and building departments in order to get such provisions written into local building codes as will give them a competitive advantage commercially. This situation is objectionable from the civic point of view. It is costly and wasteful for the industries involved, partaking as it does of the nature of a vicious circle.

A comprehensive effort is being made to improve this situation through the development of a series of national standard codes, in which requirements are stated as far as possible in terms of performance instead of in terms of particular materials. For example, the fire resistance of materials and of construction is stated in terms of one-hour, two-hour, etc. ratings under specified fire tests, instead of requiring particular materials. This policy, which is that of finding fundamental solutions, puts all the industries concerned upon a fair and equitable basis. It encourages, instead of excluding, new materials and processes. The work is being carried out under the auspices of the American Standards Association, with the close cooperation of city building officials, the National Bureau of Standards, and the various industrial and technical groups concerned.

The essence of the advantages of the standardization method is the simple, direct relation which the groups concerned in a problem have in its solution. This gives it the vitality of elementary local self-government. Each technical committee, made up as it is of representatives of all interested groups, is essentially a miniature industrial legislature organized upon an industrial instead of upon a geographical basis.

This is in sharp contrast with the weakness of the political method, which pyramids up to the one grand "decision" of vague generalities in a national election, which is thus theoretically supposed to furnish a mandate for deciding thousands upon thousands of problems through a descending hierarchy of bureaucracies.

Limitations of the Standardization Method

The standardization method has its limitations and difficulties, most of which, as would be expected, are very similar to the difficulties and breakdowns encountered by other types of human agencies, governmental or voluntary, legislature or court, church or lodge.

The interested groups are often very unequal in strength and influence. Also they may be unorganized or very loosely organized, as is not infrequently the case among consumers as compared with producers, or small retailers as compared with manufacturers, a condition which often constitutes a serious handicap in standardization work.

There is much jockeying for immediate commercial advantage. There are endless jealousies and bickerings within and between organizations, and struggles over the prestige and vested rights of organizations—the nearest equivalent of party politics.

Most Americans do not understand the meaning of representation and its responsibilities—a source of serious weakness in nearly all forms of voluntary organization as well as in our government. (This is probably due to the fact that we are accustomed to speak of our government as being representative, while it is not representational in the sense that a parliamentary government is representational.) A closely related fact is that it not infrequently happens that men agree at the council table to an undertaking, with intentions of carrying it out, and then later fail to do so. This is one of the most frequent causes of breakdown in undertakings under the cooperative method.

Then there is the problem of the "recalcitrant minority" (which in some cases is strongly organized and powerful) that refuses to cooperate unless it can have its own way completely. Frequently, in the opinion of the majority, such a group is not intelligent enough to know what its job is, and what in the long run will be most advantageous to it. In standardization work this difficulty is one which is much more apt to prevent the launching of a project than to wreck one after it is started, although instances of the latter do occur from time to time.

Of course, these and other difficulties are inherent in any important movement.

What Should Not Be Standardized

There is no value in standardizing merely for the sake of standardizing, in uniformity for the sake of uniformity. To do so takes variety and spice from life.

Standards should be set up only when doing so may be expected to result in important economies; to simplify and clarify operations; or to safeguard persons or property.

It is idle to attempt to standardize style features.

It is not the function of a standard to prevent the marketing of any product, no matter how inexpensive, but merely to enable the buyer to know what he is getting.

Most business men think that the use of standards for commercial and technical purposes should be voluntary, and that they should be made mandatory under legal authority only when such a course is necessary as a protection to persons or property or to prevent fraud.

Forms of Business and Social Control

Five forms of business and social control have been mentioned which have been developed in all Anglo-Saxon countries. Each stage was developed as the preceding stages proved too slow to keep pace with economic and social changes, especially as these changes have been accelerated by technologic development.

1. Folk ways.
2. English common law. This method developed with the breakup of feudalism.
3. Statutory law. This started its great development with the advent of the industrial era.
4. Regulation by commission. This form combines in one body many executive, judicial and legislative functions. It permits the breakdown of issues into detailed questions, and is more flexible than the legislative method.
5. The method of consensus through voluntary cooperation. This method seeks fundamental solutions of questions small enough to be handled by a committee on which all groups concerned are represented. It operates not by simple majority vote, but on the principle of obtaining a solution sufficiently basic to command a consensus of those substantially concerned with the question in hand. This method has been most highly developed in the field of standardization.

The first and second of these, folkways and common law, attained a consensus as the result

of the slow, evolutionary process by which they developed.

The third and fourth, statutory law and regulation by commission, are based upon the principle of majority rule, and hence often fail to secure a consensus. This often leads to faulty administration of law, and sometimes to complete breakdown, as witness the Volstead law.

The fifth method, that of seeking a consensus of those concerned through voluntary cooperation, is not spectacular. It requires patient, exacting work. A single industry often requires scores, even hundreds, of standards to guide it in its operations. Each standard is an undertaking in itself which, when completed, becomes one single element in a mosaic which has to be patiently built up, bit by bit, standard by standard. But since each standard represents a consensus of those concerned with this particular problem, the resulting mosaic can be made to fit the needs of the industry extremely well.

At the present time there is the most widespread criticism on the part of business that it is being over-regulated. Yet there has been, and still is, too little constructive action on the part of industry as a whole in taking hold of untoward situations and working out solutions before they get out of hand. There are exceptions, the outstanding one is the standardization work that has been done in the more technical engineering industries. Yet, if we were to list all of the regulatory agencies that are now operating under the authority of the Federal and state governments, we would find very few cases in which, prior to the establishment of an agency, industry has made a determined effort in an organized way to cure the situation on its own initiative.

Business has in this country no one organization which speaks for it in over-all policy matters. The three principal organizations of a general nature are the National Association of Manufacturers, the Chamber of Commerce of the U.S.A., and the National Industrial Conference Board. While all of these three organizations have interested themselves in a minor way with the use of standards as a means of self-regulation of business, they have not treated it as a matter of major importance.

Our free enterprise system cannot survive under a policy of mere negation. In the absence of an organized constructive policy on the part of business, any situation which gives rise to bad public relations is likely to lead to the intervention of government. Mr. Justice Frankfurter has said, "It is too often overlooked that government as a rule undertakes no services or regulations except after private agencies have proved themselves incapable or unwilling."

It is an axiom that power unused is lost by its possessor. Hence, business can ill afford to continue a course of inaction.

Problems of the type which may lead to government regulation if not solved by industry are already numerous and are bound to increase rather than decrease in number. A few of these deserve special mention.

National Standards as Preventatives of Trade Barriers

Hearings before the Temporary National Economic Committee have revealed a large number of trade barriers which are inimical to the national economy.

In his testimony, Frank Bane, executive director of the Council of State Governments said: "Hundreds of trade barriers are today obstructing the free flow of commerce among the states. Such measures, which in practice violate the spirit, if not the principle, underlying the commerce clause of the Constitution, are on the statute books of almost all the states. They are enforced generally under the state police and taxation powers, operate to benefit local producers and distributors, and tend to stimulate political and economic sectionalism."

Many of these barriers are local standards in the form of regulations of state governments; some are city ordinances; and others result from generally confused situations. It is clear from the hearings that most of these barriers could be removed—or better, could have been prevented in the first place by national standards.

This is well illustrated by the experience of the American Standards Association, whose work has led to the elimination of a considerable number of barriers. A group of voluntary standards for gas appliances has led to the elimination of restrictive ordinances in some fifty cities, resulting in a national market unencumbered by local restrictions. A refrigeration code has performed a similar function for the market for household refrigerators; and two electrical codes have been major factors in keeping a free national market for electrical appliances.

In like manner, American Standard Safety Codes covering many types of machinery, such as punch presses, grinding wheels, elevators, gears, and shafting have cleared or have kept clear of state and city barriers, national markets for these products. The unification has included the requirements of the casualty insurance companies, which were formerly frequently in conflict with state requirements.

When the present system of the control of highway traffic by light signals was introduced some years ago, there was great confusion in the use of colors. In one place, green meant "stop", in another it meant "go", and so on. Complete national uniformity resulted from the

development of the American Standard Code of Colors for Traffic Signals. Similarly, local barriers have been removed, and highway traffic has been facilitated by national standards for traffic signs, for safety glass, and for the inspection of motor vehicles.

A large part of the trade barriers now existing in this country could be eliminated by the development and use of national standards for the products and operations concerned. The constructive examples cited constitute a mere beginning. If this simple and obvious means of removing barriers is to become effective, the initiative should be taken by the leaders of those industries which are adversely affected by the barriers.

Employer-Employee Relations

There are a number of areas in the field of employer-employee relations which would greatly benefit by national standards. As has already been pointed out, substantial progress has been made in removing the safety sector from the field of controversy. In this, fifty American Standard Safety Codes have played an important part.

A sound basis is being laid for a similar group of codes for the prevention of industrial diseases. This first step is to limit the allowable concentration of toxic substances which are used in industry in such a way as to endanger the health of employees, unless properly safeguarded. Particularly important are dusts and gases. Four codes for this purpose have been developed and work on a score of others is under way.

Individual labor leaders have at times suggested that standards to define specific tasks, if worked out by cooperative effort, would have saved much controversy.

There has been much need for a standard classification of occupations. It would be helpful in jurisdictional labor disputes. The War Department has been developing such a classification in connection with defense needs.

Standards for Consumer Goods

A small vanguard of manufacturers and distributors are introducing the use of standards into the consumer goods field, and most of what has just been said about standards for producer goods applies with equal force to standards for consumer goods—broadened markets—more democracy of business opportunity—buyer and seller speaking the same language. Such standards help to channel the goods from the manufacturer, through the wholesale and retail markets to the ultimate consumer.

The demand for standards to define products lies at the very heart of the consumer movement. This has been very clearly and incisively stated on a number of occasions by representatives of the American Home Economics Association, the American Association of University Women, and the General Federation of Women's Clubs. For example: "Our economy of free enterprise is based on the assumption that the consumer will be able to judge quality and price and that he will be able to detect and shun fraudulent products. We believe that the best way to enable the consumer to exercise his alternative proper role is through the development and general use of standards for staple goods offered for sale on the retail market.

"Such standards may be in the form of specifications for one or several grades; they may be definitions of words to be used for certain products, such as the rayon and fur-trade rules; they may be sizing of garments on the basis of body measurements. Since standards are sought for products, not people, matters of individual taste, such as fashions, are outside their scope.

"One of the major factors in intelligent income-use is ability to identify the relation between price and value of goods and services, so the individual may select those best adapted to his needs at a price he can afford to pay.

"If it were possible for the consumer to do this, we would need fewer regulatory laws and protection from fraud would become a less expensive public problem. In the last analysis, concealment of the relative worth of goods and services is a kind of fraud, though it is not generally recognized as such.

"Everyone recognizes that price would mean nothing without knowledge of *how much* was being offered at a given price. Those interested in income-use believe that price is equally meaningless without knowledge of *what* is being offered at a given price. Buyers are helpless in trying to compare the real value to them of two pairs of silk hosiery, two suits of clothes, or two mechanical refrigerators at different prices when there is no way for them to make accurate comparisons between their quality and performance in use."

Certification and Labeling

Labels on the goods which state that they comply with a particular standard provide the most practical way of informing the individual consumer that the goods do comply with the standard. Drugs which comply with the requirements of the U. S. Pharmacopoeia are easily identified by the letters "U.S.P." on the labels. Recently several manufacturers and distributors of canned fruits and vegetables have begun to grade-label certain of their products according to grades established by the U. S. Department of Agriculture.

Industrial purchasers generally have means of checking their purchases to make sure that the product complies with the specifications upon which the order was placed. But the individual does not have any means of checking his purchases to make sure that they comply with the standard as represented to him by the seller.

This lack can be filled by systematic testing and certification by an independent laboratory or similar agency. For example, specifications for household lamps have been developed by the Illuminating Engineering Society which assure good, adequate lighting, free from glare. This "IES lamp" is being manufactured and marketed by any manufacturer who is willing to meet the specifications. Compliance is controlled by testing and inspection by an independent laboratory, and each lamp is labeled to certify compliance with the specifications. This use of standards, inspection, and labeling, is a notable development in merchandising. Underwriters' Laboratories operate a somewhat similar system, but their work is limited to features having to do with fire and casualty hazards.

Plans have been prepared for a general organization to carry out these functions of testing, inspection, certification and labeling of products functions which are particularly important in the case of consumer goods all to assure compliance with nationally recognized standards—and all carried out through the cooperation of manufacturers, distributors, consumers and publishers. Such plans have been developed by the Institute of Standards, but they have not yet been put into operation.

Standards Needed to Determine Truth or Falsity of Advertising

Standards in the consumer goods field relieve advertisers of a dilemma. One of the most important reasons that efforts to establish "truth in advertising" have not met with a much larger degree of success is that so few definitions have been agreed upon. Consequently differences of opinion as to what constitutes truth still persist.

For example, when in advertising "Hudson Seal Coats" a few years ago, many, if not most, readers of the copy thought that the fur had grown on the back of a seal. But when "Dyed Muskrat" was added, a standard was being used —an agreed-upon definition—and there was no chance of misunderstanding.

Unfortunately even where definitions have been available, the refusal of many business organizations to use them in advertising and on labels has caused resentment on the part of consumers, and has led many of them to seek legislation as the only effective remedy.

Standards Reveal Concealed Price Increases in Periods of Changing Price Levels

Standards for consumer goods also relieve the retailer of a dilemma. When in order to meet changing price levels the manufacturer lowers the quality of a product in fixed price lines there results a concealed price increase. This is frequently the cause of consumer complaint. The Bureau of Labor Statistics in its retail price studies has found it necessary to set up a large number of rudimentary specifications to define the products being priced, in order that the data may be comparable.

It is thus seen that the consumer movement presents to business a public relations problem in relation to standards that is of far reaching importance. A survey to determine the extent and penetration of the movement was made by Dr. George Gallup for the Association of National Advertisers in 1939. Fifty-three percent of those questioned were interested in the standardization of products, and twenty-four percent of them had read one or more consumer books. Forty-nine percent of those who knew about grade labeling believed it should be made compulsory by the government. From the data it was estimated that there are ten to twelve million of the more literate population of the country who have a fairly intelligent view of the consumer movement.

A repeat survey made by Dr. Gallup a year later showed that the movement had grown, and that in some respects it was becoming a bit more conservative.

Importance in National Defense

The defense program brings the whole subject of standards into sharp focus. A manufacturer who takes a contract for a product which differs from his regular line of production is faced with the necessity of making many changes in the equipment and operation of his plant. His problems are much like those of an automobile manufacturer in re-tooling for a new model. These problems are basically problems of standardization.

Every government order carries with it the specifications or standards that define the gun, tank, blanket, or truck that the manufacturer has to make, or the materials that he has to supply. A single government order may extend to hundreds of companies—manufacturers of parts or suppliers of materials. Many of the companies will not have had experience with these particular products. Each of them in turn must control all his operations so that the completed product

will comply with the standards originally laid down as a part of the order. Hence every one of these manufacturers must have a thorough understanding of standards—how to work to them in shop, processing plant, and assembly line.

The use of standards in the purchasing of supplies by federal, state and city governments is closely related to the defense program and it presents a major opportunity for economy, principally to the public agencies, but also to a considerable degree to the business suppliers. The same is true of institutional purchasing generally. The Federal Government, a few states, and some cities have made outstanding progress in this field with resulting large savings. It has been estimated that the various bureaus and agencies of the Federal Government have in all some 7,000 specifications for the materials and supplies which they purchase. This covers both civil and military needs.

Partly as a result of the work of the Defense Commission, and partly as a result of criticisms by industry of troublesome differences in specifications used by the different bureaus and departments, the Government has plans under way for bringing all government specifications into closer accord, as has already been done in the case of some 1,300 specifications which have been unified under the authority of the Federal Specifications Executive Committee. This Federal Specifications work is attached to the Procurement Division of the Treasury Department. To help bring the work into closer accord with industrial practice, the Treasury Department has recently affiliated with the American Standards Association as a Member-Body.

The integration of the entire process into a smooth flow like a great river system is an enormous undertaking. Shortcomings in the government standards or in the manufacturers working to them—too many kinds of products—obsolete requirements—unnecessarily close fits—faults in workmanship or materials—all result in bottlenecks which cut down the flow of the goods. A great many of these bottlenecks are due to a lack of adequate national standards acceptable to government and industry alike.

Summary

1. It is a commonplace that standardization has been an essential factor in the great increase in the real incomes of the populations of industrial countries since the latter part of the nineteenth century. This is because standards underlie all mass production methods, and because they facilitate the integrating processes necessary to large scale production and distribution.

2. Most of the criticisms that have been directed against standardization have been based upon the misconception that standardization means to stand still. To an industrialist a sound standard represents the best way of doing a thing—at the moment. If tomorrow he finds a better way, he will codify it in a new standard. Sound standardization is dynamic, not static. It means, not to stand still, but to move forward together. By facilitating the flow of products through industry and commerce, standards help to maintain what an engineer would call *dynamic stability* in industrial processes—just as a motor car in motion or an airplane in flight will respond with nicety to the slightest touch on the controls, and will right itself instantly following any slight disturbance—such as a bump in the roadway or a gust of wind—provided the machine has dynamic stability. The danger of stagnation lies, not in the use of standards, but in taking a fixed mental attitude, instead of always keeping the mind receptive to new ideas.

3. In standardization business has available a simple method of avoiding a great deal of governmental regulation, by solving many types of problems which give rise to it step-by-step, and doing so as they arise—instead of waiting until they pyramid into unmanageable form, resulting in legislation.

4. To accomplish this industry will have to adopt the policy of taking the initiative in constructive action; the present trend cannot be changed by inaction. None of the principal organized business groups of a general character has adopted such a course as a major policy.

5. It has often been suggested that in standardization work an ideal relationship between industry and government has been developed, namely, that the government departments participate in an undertaking on precisely the same basis as that of any other organized technical, industrial, or consumer group. This means that they participate in proportion to their direct concern with the problem in hand, and to the extent that their technical resources enable them to contribute to the solution, rather than by assuming the direction of the whole undertaking.

6. The lack of a sufficient number of sound national standards is one of the main causes of the growth of trade barriers.

7. The problem of standards for consumer goods is a major one from the point of view of public relations of business.

8. A system of well articulated standards is basic to the defense program. It is equally important in peace time and in times of emergency. While the situation in regard to standards is decidedly better than it was in 1917, there is urgent need for far more coordination, both within industry, and as between industry and government.